ERCB

Pipelines—Requirements and Reference Tools

Revised edition March 21, 2011 (updated December 22, 2011)

The Energy Resources Conservation Board (ERCB/Board) has approved the updates to Part A: Requirements of this directive on December 12, 2011. The table on the verso of this title page provides a list of these updates.

<original signed by>

Dan McFadyen
Chairman

Table of Changes

Sections changed/added	Date changed/added*
What's New	December 2011
How to Use this Directive	December 2011
Part A	
Section 6	December 2011
Section 7	December 2011

* This is the date that will appear in the footer. For sections that have not been changed, the footer will contain the date of the revised edition.

ENERGY RESOURCES CONSERVATION BOARD
Directive 077: Pipelines—Requirements and Reference Tools

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Overview

Background

For the purposes of pipeline regulation, the Energy Resources Conservation Board (ERCB) applies the requirements specified in the Alberta *Pipeline Act* and in the *Pipeline Regulation*. The *Pipeline Act* establishes the administrative authority, and the *Pipeline Regulation* contains specific technical requirements to be applied in Alberta. For the basic technical requirements applicable to the design, construction, and operation of oil and gas pipelines in Alberta, the *Pipeline Regulation* adopts the most current edition of the Canadian Standards Association *CSA Z662: Oil and Gas Pipeline Systems*. The requirements in the *Pipeline Regulation* are additional to and prevail over those given in *CSA Z662*. Periodically, the ERCB may amend the *Pipeline Regulation* or specify additional technical requirements as deemed appropriate, usually by way of a directive. These additional technical requirements may be rescinded at a later date if the CSA standard is amended. When appropriate, ERCB directives may contain additional interpretive or instructional information that may be inappropriate for inclusion in the *Pipeline Regulation*. If the requirement can be expressed succinctly, it may be amended at a future date into the *Pipeline Regulation*.

Purpose of This Directive

Directive 077: Pipelines—Requirements and Reference Tools amalgamates ERCB directives, informational letters (ILs), interpretive documents, and reference tools related to pipelines into this one document. *Directive 077* supplements the *Pipeline Act* and *Regulation* and *CSA Z662*. The intent is to provide a single source of such information for easy access and to enable timelier updating.

Part A incorporates existing requirements from directives that are consequently rescinded, as well as new requirements. References to related existing standards and regulations are at the end of each section.

Part B includes reference tools on specific topics to assist industry in meeting pipeline requirements and understanding various processes.

How to Use This Directive

ERCB requirements and recommended practices are listed separately within each section throughout this directive. "Must" indicates a requirement for which compliance is required and that is subject to ERCB enforcement, while "recommends" indicates a best practice that can be used by the applicable party but is not an ERCB requirement and does not carry an enforcement consequence. The requirements are numbered sequentially within each section of Part A. Part B provides explanation of requirements and uses "must" where necessary to ensure compatibility with the requirement. The explanations in Part B are always subordinate to the root requirements.

Updates will periodically be made to the latest revised edition of the directive. These updates will be identified in the directive's Table of Changes and What's New section and announced in a bulletin. The footers in the relevant sections will contain the date of the updates. All other sections will retain the date of the latest revised edition.

What's New

The following two sections, effective December 22, 2011, are new.

Part A

- Section 6: Use of Liquid Test Media Other than Fresh Water for Pipeline Tests

  This section clearly defines the requirement for contingency plans to be prepared prior to pressure testing with liquid test media other than fresh water and enables a pipeline licensee to proceed with a pressure test once a contingency plan has been developed and documented and any necessary preparatory activities implemented. This replaces the current requirement to obtain approval prior to proceeding with the pressure test. Accordingly, Section 35 of the *Pipeline Regulation* has been concurrently amended with the release of this section.

- Section 7: Twenty-one-day Temporary Surface Pipelines for Well Testing

  This section sets out the process for 21-day temporary surface pipelines for well testing, which has been transferred from *Directive 056: Energy Development Applications and Schedules*, and provides additional clarity on the use of temporary surface pipelines. The requirements address the use of temporary pipelines to reduce flaring and venting during well testing.

Related ERCB Documents

The following is a comprehensive list of all ERCB documents (directives, bulletins, informational letters, interim directives, etc.) that contain information related to pipelines.

Directives

Directive 006	Licensee Liability Rating (LLR) Program and Licence Transfer Process
Directive 017	Measurement Requirements for Upstream Oil and Gas Operations
Directive 019	Compliance Assurance
Directive 026	Setback Requirements for Oil Effluent Pipelines
Directive 038	Noise Control
Directive 056	Energy Development Applications and Schedules
Directive 060	Upstream Petroleum Industry Flaring, Incinerating, and Venting
Directive 066	Requirements and Procedures for Pipelines
Directive 071	Emergency Preparedness and Response Requirements for the Petroleum Industry
Directive 076	Operator Declaration Regarding Measurement and Reporting Requirements

Interim Directives

ID 81-03	Minimum Distance Requirements Separating New Sour Gas Facilities from Residential and Other Developments
ID 96-01	Hay-Zama Lake Complex—Special Requirements
ID 2001-05	Public Safety and Sour Gas Policy Implementation Recommendations 54, 60, and 61: Site-Specific Emergency Response Plans for Sour Operations, Emergency Planning Zones, and Reduced Planning Zones

Informational Letters

IL 82-11	Preservation of Archaeological, Palaeontological, and Historical Resources: Policy Update
IL 90-21	Oil and Gas Development—Rumsey Block
IL 93-09	Oil and Gas Developments Eastern Slopes (Southern Portion)
IL 94-22	Operating Guidelines for Industrial Activity in Caribou Range—North-West Alberta

IL 95-07	Subdivision and Development Regulation Requirements for Referrals to the Alberta Energy and Utilities Board
IL 98-01	Memorandum of Understanding between Alberta Environmental Protection and the Alberta Energy and Utilities Board Regarding Coordination of Release Notification Requirements and Subsequent Regulatory Response
IL 2002-01	Principles for Minimizing Surface Disturbance in Native Prairie and Parkland Areas

Compliance Assurance

Noncompliance with the requirements in this directive may result in the licensee of the pipeline or duty holder receiving a response from the ERCB in accordance with the processes described in *Directive 019*.

Part A Requirements

1 Corrosion Barriers under Pipeline Insulation

1.1 Background

CSA Z662, Clause 9, requires the control of internal and external corrosion of pipelines and also requires that any buried pipeline must have an external corrosion barrier coating, as well as cathodic protection. In the case of insulated pipeline systems, CSA is not specific as to whether a corrosion barrier coating is to be applied directly onto the carbon steel pipeline underneath the insulation. The primary stipulations are that the coating must isolate the external surface of the piping from the environment and resist water ingress.

While systems using only an externally applied coating over the insulation might achieve isolation, the ERCB has concerns about the longevity of such systems and about the corrosion that may occur under the insulating material in the event the external coating is breached and water migrates under the insulating material. Under those conditions, cathodic protection will not be able to protect the metallic pipeline and external pipeline corrosion may occur.

CSA Z245.22-10: Plant-Applied External Polyurethane Foam Insulation Coating for Steel Pipe standard provides the requirements for the application of foam insulation coating.

1.2 Requirement

1) An applicant for a licence for a buried insulated pipeline

   a) must ensure that any carbon steel pipeline being installed has a corrosion barrier coating applied directly to the carbon steel pipe, under any insulating material,

   or

   b) if the coating system to be used does not include a corrosion barrier applied directly to the carbon steel pipe, must

      i) submit to the ERCB evidence of the long-term corrosion-control performance of the carbon steel pipe without a directly applied corrosion barrier coating, and

      ii) obtain written ERCB approval for exemption from (a).

1.3 Interpretation

The above requirement is not intended to apply to rack-installed pipelines, aboveground steam or production pipelines, or temporary surface pipelines.

Any request for exemption from requirement (1)(a) is to be submitted to pipelineoperations@ercb.ca.

1.4 References

CSA Z662-07: Oil and Gas Pipeline Systems

CSA Z245.22-10: Plant-Applied External Polyurethane Foam Insulation Coating for Steel Pipe

2 Cathodic Protection of Risers and Underground Couplers

2.1 Background

CSA Z662, Clause 9, includes requirements for the control of internal and external corrosion of pipelines. Clause 9 requires that any buried steel pipeline must have an external corrosion barrier coating, as well as cathodic protection. In the case of nonmetallic pipelines, which are generally considered to be non-corrodible, the requirement for external corrosion barrier coatings and cathodic protection is considered to be unnecessary.

Though the non-metallic line pipe may generally be considered as non-corrodible, these installations sometimes make use of standard metallic pipeline risers. It is also common to join multiple reels of continuously spooled composite pipe using the manufacturer's proprietary metallic compression fittings or couplings.

2.2 Requirements

1) At the time of installing a buried riser or coupler using stainless steel, corrosion-resistant alloy, or corrosion-resistant alloy-plated materials associated with a pipeline, the licensee must

   a) apply an external corrosion barrier coating directly over the buried riser or coupler and supply effective cathodic protection to the metallic parts, or

   b) complete an engineering assessment that demonstrates that the coating or cathodic protection is not necessary.

2) If an engineering assessment is conducted pursuant to requirement 1(b), the licensee must

   a) ensure that the assessment considers the site-specific operating conditions, and

   b) provide a copy of the assessment to the ERCB upon request.

3) If installing a buried riser or coupler using metallic materials other than those identified in requirement (1), at the time of installation the licensee must

   a) apply an external corrosion barrier coating directly over the carbon steel or metallic surface, and

   b) supply effective cathodic protection to the carbon steel or metallic parts.

2.3 Interpretation

The ERCB does not expect underground couplers to include a means to evaluate the level of the cathodic current to that fitting (for example, a test post) if these fittings are located in an inaccessible location or if the test post would be a hindrance to surface land use. In conjunction with the corrosion barrier coating, a sacrificial anode should provide sufficient extended service.

2.4 References

CSA Z662-07: Oil and Gas Pipeline Systems

3 Overpressure Protection for Pipelines Connected to Artificial Lift Equipment

3.1 Introduction

This section describes the requirements for overpressure protection for pipelines connected to artificial lift equipment. ERCB field inspection records indicate that a number of pipeline failures have been related to overpressure situations associated with artificial lift equipment (for example, pump jacks) that relied on only one overpressure protection device (for example, pressure switch) for shutdown. Inspection records have further indicated that improper inspection practice and delayed replacement of defective overpressure protection devices also contributed to these failures.

3.1.1 CSA Requirements and Current Industry Practice

Clause 4.18 of *CSA Z662-07* and Section 22 of the *Pipeline Regulation* require pressure control and overpressure protection for pipelines where there is a source capable of overpressuring the pipelines.

To protect the well sites and the associated gathering pipeline systems, the common industry practice is to use a back-pressure control valve (BPCV) located on a pressure vessel in the battery as pressure control for the pipeline, and to use a pressure switch located at the wellhead as overpressure protection that shuts down the artificial lift equipment at the well. However, the pipelines are not always provided with a dedicated pressure control and overpressure protection system, as required by *CSA Z662-07*.

The ERCB does not consider this design to be meeting CSA requirements since, in many cases, the BPCV is not capable of providing pressure control, for example when the battery inlet emergency shutdown valve (ESDV) is closed during emergency or an upset situation, thus isolating the pipeline from the BPCV and nullifying the effect of dual protection as required by *CSA Z662-07*.

3.1.2 Proactive Response

The ERCB considers these failures to be understood and preventable by making changes to the design or by enhancing inspection and maintenance practice. Therefore, in an effort to continue ensuring pipeline safety and protecting the environment from spills, the ERCB requires licensees to take proactive measures, as set out below, to address the issue.

3.2 Requirements

The following definitions apply to the requirements in this section:

- A competent individual is a person who is qualified, trained, and experienced to perform the required duties.
- A defective or nonfunctioning overpressure protection device is a device that is not capable of preventing the pipeline pressure from exceeding the maximum operating pressure by more than 10% or 35 kPa, whichever is greater.

1) Where artificial lift equipment is capable of supplying pressure in excess of the pipeline maximum operating pressure either (a) or (b) is required:

   a) the licensee of the pipeline must

      i) have two independently operating overpressure protection devices designed to protect the pipeline from experiencing excess pressure;

ii) ensure that the two overpressure protection devices will not allow the licensed maximum operating pressure of the pipeline to be exceeded by more than 10% or 35 kPa, whichever is greater, as described in *CSA Z662-07*; and

iii) conduct inspections, assessments, and testing of the devices described in (a)(i) in accordance with *CSA Z662-07*, Clause 10.7.5.2;

or

b) the licensee of the pipeline must have

i) a single overpressure protection device designed to protect the pipeline from experiencing excess pressure;

ii) ensure that the single overpressure protection device will not allow the licensed maximum operating pressure of the pipeline to be exceeded by more than 10% or 35 kPa, whichever is greater, as described in *CSA Z662-07*;

iii) a competent individual conducting monthly inspections, assessments, and testing on the single overpressure protection device; and

iv) a certified instrumentation technician conduct annual inspections, assessments, and testing, with maximum interval of 18 months between such activities, on the single overpressure protection device to ensure that the monthly inspections, assessments, and testing are correctly conducted and that the device is not defective or nonfunctioning.

2) A defective or nonfunctioning overpressure protection device must be repaired or replaced before the pipeline licensee resumes operation of the pipeline.

3) For all overpressure protection devices, the pipeline licensee must

a) maintain adequate inspection, assessment, and testing records for the overpressure protection device, and

b) submit the records to the ERCB upon request.

4) Inspection, assessment, and testing records must document the information used to perform effective evaluation of the overpressure protection device; the results of the inspection, assessment, and testing; and the resolution of any issues regarding a defective or nonfunctioning device prior to the resumption of pipeline operations by the licensee.

3.3 Interpretation

At locations where the licensee of the pipeline and the licensee of the artificial lift equipment are different, it is the responsibility of the pipeline licensee to ensure protection of the pipeline from the artificial lift equipment. If the pipeline licensee is not able to reach a suitable arrangement with the licensee of the artificial lift equipment to comply with the requirements of Section 3.2, the pipeline licensee must install an overpressure protection device(s) in accordance with Section 3.2 before operating the pipeline.

Questions regarding this section may be addressed to the ERCB Field Surveillance and Operations Branch, Technical Operations Group by e-mail to pipelineoperations@ercb.ca.

3.4 References

CSA Z662-07: Oil and Gas Pipeline Systems

4 Use of High-Performance High-Density Polyethylene Pipe in Oil and Gas Service

4.1 Background

The ERCB developed *Directive 022: Use of Bimodal High-Density Polyethylene Pipe in Oil and Gas Service* in 2005 to provide industry with an interim method to license bimodal high-density polyethylene (HDPE) pipe materials, typically known as PE 80 and PE 100, for oil and gas industry use. At that time, *CSA Z662-03: Oil and Gas Pipeline Systems* did not recognize International Organization for Standardization (ISO) qualified bimodal HDPEs. There was interest in using these materials due to their improved slow crack growth resistance and rapid crack propagation resistance, as well as the higher working pressures allowable when designed using ISO design methodology.

Pressure design of HDPE pipelines in North America has traditionally been based on American Society for Testing and Materials (ASTM) *D2837*, which specifies material strength as the hydrostatic design basis (HDB) expressed in megapascals (MPa). The HDB value, along with design or safety factors appropriate to the intended service as specified in *CSA Z662-07*, Clause 13.3, is used to calculate the maximum allowable working pressure.

In the time since the release of *Directive 022*, the *ASTM D3350-08: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials* has been amended to allow for the differentiation and inclusion of higher performance HDPE resins, which may include certain bimodal polyethylenes. New polyethylene grades 3608, 3708, 3710, and 4710 are now included in *ASTM D3350* and these can provide similar pressure ratings to the bimodal HDPE materials. In some cases, pipe is manufactured with dual certification and therefore can qualify for both ASTM and ISO designation.

As the bimodal resins were developed in Europe, standards applicable to their use are ISO standards, and pipe material strength values were qualified using the *ISO 9080* method. The strength values determined by *ISO 9080* are expressed as minimum required strength (MRS), also in MPa, but are determined differently from the *ASTM D2837* method. Other ISO standards also specify different methods of applying appropriate design and safety factors. The net effect of this is that while both systems have proven to be effective and conservative in determining safe working pressures for HDPE pipe, the two qualification and design methodologies may not be intermixed. Therefore, when conducting pressure design, it is necessary to work entirely within whichever system the material strength has been determined.

With the adoption of the new polyethylene grades into *ASTM D3350*, there has been a significant reduction in interest in using the ISO design processes for the installation of high-performance HDPE pipe.

4.2 Requirements

The following sections replace and rescind *Directive 022*, but allow for the licensing or repair of PE 80 or PE 100 materials.

1) The requirements contained in Section 4.3, below, must be followed by the licensee of an HDPE polyethylene pipeline for the licensing or repair of PE 80 or PE 100 materials.

2) When applying to use ISO-based design for PE 80 and PE 100, an applicant must follow the ERCB *Directive 056* nonroutine application process.

3) The licensee of an HDPE polyethylene pipeline must ensure that the fusion joining, installation, and quality verification are in accordance with *CSA Z662-07*, Clause 13.3.

The ERCB will no longer consider the use of the additional "categorized required strength" (CRS) method of material qualification beyond any requirements that may be included in *CSA Z662-07*.

Preapproval for joining and installation procedures for PE 80 or PE 100 is no longer required.

There are no changes to the basic design methodology for PE 80 and PE 100 as originally outlined in *Directive 022: Application Process Using ISO Methodology*.

4.3 ERCB Directive 056: Energy Development Applications and Schedules

Applications in accordance with the ISO design protocols for PE 80 and PE 100 must be made using the standard *Directive 056* process and must be made as **nonroutine**. The pipe *material* code is P, the *type* is P80 or P100 (enter P80 or P100 into the Schedule 3.1 4-digit field), and the *grade* indicates the standard dimensional ratio (SDR).

4.3.1 Design

Basic pressure design for type PE 80 or PE 100 pipe is described in *ISO 12162-1995* as follows:

$$P = (2MRS / (SDR-1)) / C$$

where

MRS is in MPa

SDR is standard dimensional ratio (O.D. / minimum wall thickness)

C is the design coefficient of 1.25

Note that the MRS as determined by *ISO 9080-2003* reflects a 50-year extrapolation for water service at 20°C only. For PE 80 pipe applications, the MRS is 8.0 MPa, and for PE 100 pipe applications the MRS is 10.0 MPa. The recommended ISO design coefficient of 1.25 is intended to reflect **only material variations**, such as might be due to processing and extrusion. **Additional design coefficients** are required to reflect service conditions and to consider variances due to the effects of pipe laying, joining, and installation practices.

1) Therefore, for gathering system pipelines under ERCB jurisdiction, pressure design for type PE 80 or PE 100 pipe must use the following modified formula:

$$P = (2MRS / (SDR-1)) / (C_a \times C_m \times C_t)$$

where

MRS is in MPa at 20°C and 50-year design life

SDR = standard dimensional ratio (O.D. / minimum wall thickness)

C_a = the design coefficient reflecting the application

C_m = the design coefficient reflecting the material only; 1.25 for PE 80 and PE 100

C_t = a generic design coefficient reflecting the design temperature, derived from the *ISO 10839* standard

C_a and C_t are to be taken from the following tables:

Service	Design coefficient C_a
Oil and gas field water	1
Dry gas gathering	1.12 (ERCB requirement)
Dry gas distribution	1.6 (ERCB requirement)
LVP fluids	2 (ERCB requirement)
Hydrocarbon wet gas gathering	2 (ERCB requirement)

Design temperature	Temperature coefficient C_t
Up to and including 20°C	1
Over 20°C up to and including 30°C	1.1
Over 30°C up to and including 40°C	1.3

Note that the product of C_a x C_m for gas distribution service results in an overall design coefficient of 2, (1.6 x 1.25), which is in agreement with the value specified by *ISO 4437-2007* for gas distribution service.

Note that if PE 80 or PE 100 is to be used in oil and gas field use, the ERCB accepts only MRS values calculated at 20°C and extrapolated to a 50-year lifespan. Also note that maximum service temperature addressed by the ISO standards is 40°C.

4.3.2 Installation Practices

1) Installers of all HDPE polyethylene pipelines must have documented fusion joining and installation procedures for the specific pipeline installation, as required in *CSA Z662-07*, Clause 13.3.

2) The joining and installation manual must be present at the job site and the manual must be understood by installation personnel.

3) Installers of high-performance HDPE pipe must wherever possible use automated data-logging equipment that makes a permanent record of the fusion parameters used to complete each joint.

4) Each joint must be permanently marked with an identification number corresponding to each individual record on the data log.

5) The data record must be kept for the lifetime of the pipeline. If manual fusion equipment is necessary, a manual record of the same parameters must be kept.

4.3.3 Quality Control

1) The installer must remove sample joints for testing, in accordance with the requirements of *CSA Z662-07*.

2) If there are any failures by destructive testing, a reconciliation of fusion data must be conducted to determine whether any previous joints may be affected, and there must be further testing of previous joints, in accordance with the requirements of *CSA Z662-07*.

3) Completed pipeline segments must be pressure tested in accordance with *CSA Z662-07* requirements for HDPE pipe, which may sometimes differ in procedure from some manufacturers' recommendations.

4) A manufacturer may impose maximum pressure limitations, and the user must ensure selection of compatible maximum operating pressure (MOP) and testing pressure.

4.4 References

ASTM D3350-08: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

ASTM D2837-08: Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products

CSA Z662-07: Oil and Gas Pipeline Systems

ISO 12162-1995: Thermoplastics Materials for Pipes and Fittings for Pressure Applications—Classification and Designation, Overall Service (Design) Coefficient

ISO 9080-2003: Plastics Piping and Ducting Systems—Determination of the Long-Term Hydrostatic Strength of Thermoplastics Materials in Pipe Form by Extrapolation

ISO 4437-2007: Buried Polyethylene (PE) Pipes for the Supply of Gaseous Fuels—Metric Series, Specifications

5 Adoption of *CSA Z662-07*, Annex N, as Mandatory

5.1 Background

In July 2006, the ERCB (formerly the Energy and Utilities Board) approved *Directive 041: Adoption of CSA Z662-03, Annex N, as Mandatory.* Annex N: Guidelines for pipeline integrity management programs was updated in *CSA Z662-07*. Clause 16.8.8 of *CSA Z662-07* requires that for sour service pipeline systems, the operating company must develop, document, and implement a pipeline integrity management program that is in accordance with Annex N. Annex N provides an approach for ensuring that pipelines are capable of transporting product safely, with no short-term or long-term negative effects on public safety or the environment.

Clause 10.2 of *CSA Z662-07* requires that operating companies develop, implement, and maintain a documented safety and loss management system for their pipeline systems that provides for the protection of people, the environment, and property. The clause also lists the elements that must be included in the safety and loss management system and cites Annex A, which sets out a recommended practice for safety and loss management systems.

A licensee's integrity management program can form part of its documented safety and loss management system, which is required under Clause 10.2 of *CSA Z662-07*.

This Section 5 replaces and rescinds *Directive 041*.

5.2 Requirement

1) A pipeline licensee must develop, implement, and document for all its pipelines a pipeline integrity management program that complies with the latest edition of *CSA Z662*, Annex N.

5.3 Interpretation

A documented integrity management program is required for all pipelines, not just sour service pipelines.

The ERCB Pipeline Integrity Management Program Assessment Form and Guidelines are available on the ERCB Web site under Directives : Directive 077 to assist industry in complying with this requirement.

5.4 References

CSA Z662-07: Oil and Gas Pipeline Systems

6 Use of Liquid Test Media Other than Fresh Water for Pipeline Tests

6.1 Background

The *Pipeline Regulation*, Part 2, Section 9, and Part 3, as well as *CSA Z662-11*, provide the requirements for pressure testing of pipelines.

Sections 2 and 24 of the *Pipeline Regulation* require the licensee to notify the ERCB using the Digital Data Submission system at least 48 hours prior to the start of any pressure test.

CSA Z662-11, Clause 6.2.11, describes requirements for horizontal directional drilling, including post-installation pressure testing of the drag section as specified in Clause 8. Clause 6.2.11 also encourages consideration of a pre-test of the drag section.

CSA Z662-11, Clauses 10.3.8 and 10.3.9, require that an engineering assessment be carried out before pressure testing an existing pipeline to determine that the pipeline can withstand the pressure.

Usual practice requires the use of fresh water as a test medium; however, alternative media may be used in certain situations. Where an alternative liquid is used as a test medium, *CSA Z662-11*, Clause 8.7.2, requires the licensee to develop a contingency plan to protect the environment in the event of leakage during testing.

The purpose of the contingency plan is to predetermine and prepare to execute the actions necessary to minimize the extent, impact, and consequence of a release or spill of the test medium.

The *Pipeline Regulation*, Section 35, which has been amended, includes criteria for applying the requirements of Section 6.2, below.

6.2 Requirements

For the requirements in this section, a "new welded steel pipeline" is defined as a steel pipeline that has circumferential joining done by welding, has not been in previous operation, and was constructed within the previous 12 months.

1) If any of the three criteria in Section 35(1) of the *Pipeline Regulation* apply, the licensee must complete the following:

   a) for a new welded steel pipeline, nondestructively inspect all welds in accordance with Clause 7.10.4 or 16.9.3 of *CSA Z662-11*, as applicable, for the entire pipeline portion within 100 m of flowing water and remove or repair all welds that are found unacceptable;

   b) prior to the start of pressure testing,

      i) develop and document a contingency plan for immediate response in the event of a leak or spill of the liquid test medium, and

      ii) deploy the necessary equipment and resources to the test site, with focus on areas of flowing water, to ensure that full implementation of the contingency plan can be achieved without delay in the event of a spill or release of the test medium in preparation for, during, or following pressure testing;

c) accurately complete all applicable sections of Form A6.1: Non-Fresh Water Liquid Pressure Test for Pipelines, used to summarize spill response preparations, at least 48 hours before starting the pressure test;

d) maintain a copy of the completed Form A6.1 on site during pressure testing;

e) submit the completed Form A6.1 and contingency plan to the ERCB upon request; and

f) maintain the original completed Form A6.1 for at least two years from the completion date of the pressure test.

2) The licensee must obtain written approval from the ERCB for any deviation from requirement 1 before testing a pipeline using a liquid test medium other than fresh water.

Requests for any deviation from requirement 1 are to be submitted to pipelineoperations@ercb.ca and must include a completed Form A6.1, along with a justification for the deviation.

6.3 References

Pipeline Regulation

CSA Z662-11: Oil and Gas Pipeline Systems

ERCB Energy Resources Conservation Board

Directive 077, Form A6.1
Non-Fresh Water Liquid Pressure Test for Pipelines

Type in the grey boxes, which will expand to accept text.

SECTION 1: COMPANY/LICENSEE INFORMATION

Licensee name: BA code:

Mailing address (include postal code):

Contact information (name, position, telephone number, e-mail address):

Proposed test date:

Signature of operating company responsible representative:

SECTION 2: PIPELINE SPECIFICATIONS

Pipeline Licence No.: Pipeline Line No.:

Total pipeline length to be pressure tested: m

Pipeline outside diameter: mm Pipeline MOP: kPa Licensed substance:

Pipe grade: MPa Pipe material:

Liquid test medium: Test medium composition: Water % Methanol % Other (please specify) %

Pipeline FROM location: Pipeline TO location:

Pipeline hoop stress (at max, test pressure; N/A for composite pipe): % SMYS Maximum test pressure: kPa

Test duration: hours

SECTION 3: PRESSURE TESTING GENERAL

1. Will the volume of any test section exceed 500 m^3? ☐ Yes ☐ No
2. Will the hoop stress during the test exceed 100% SMYS of the pipe? ☐ Yes ☐ No
3. Does the pipeline cross or is it within 100 m of flowing water? ☐ Yes ☐ No

Locations of flowing water sites:

Names of flowing water sites that the pipeline crosses or is within 100 m of:

Type of flowing water sites: ☐ Creek ☐ River ☐ Lake ☐ Other (e.g., muskeg)

SECTION 4: SPILL CONTROL AND RECOVERY CONTINGENCY PLANS

Note: Where the responses to questions 1, 2, and 3 are NO, the licensee must develop contingency plans in accordance with Clause 8.7.2 of *CSA Z662-11* to protect the environment in the event of leakage during testing.

If any response to question 1, 2, or 3 was YES, complete (4) through (10).

4. For a new welded steel pipeline, were all welds nondestructively inspected in accordance with Clause 7.10.4 or 16.9.3, as applicable, of *CSA Z662-11*, for the entire pipeline portion within 100 m of flowing water and all welds found unacceptable removed or repaired?

   ☐ Yes ☐ No ☐ Not applicable

   If NO, submit a request for deviation to pipelineoperations@ercb.ca, in accordance with Section 6.2, requirement 2.

5. Describe the contingency plan developed for immediate response in the event of a leak or spill of the liquid test medium.

6. Provide a detailed description of the spill containment methods that will be employed, including control points and equipment that will be available in the event of a release or spill occurring in preparation for, during, or following testing. (You may attach information.)

7. Provide an estimate of response and containment times.

8. Provide a description of spilled fluid recovery methods.

9. Explain where control equipment and personnel will be located.

10. Describe methods and location(s) for disposal of test medium.

7 Twenty-One-Day Temporary Surface Pipelines for Well Testing

7.1 Background

This section addresses the process for obtaining approval for a temporary pipeline for the purposes of testing a well for no more than 21 consecutive days.

The licensee must follow the *Directive 056: Energy Development Applications and Schedules* process for any temporary pipelines for purposes other than well testing or for well testing longer than 21 consecutive days.

7.2 Requirements

For the requirements in this section, "consecutive days" is defined as the total number of days, including the start of the well testing and any temporary interruptions.

1) The well licensee that proposes to install and operate a temporary surface pipeline for the purpose of testing a well for not more than 21 consecutive days from the date of commencement of well testing operations must obtain written ERCB consent prior to construction of the pipeline.

2) If requirement 1 applies, the licensee must

   a) complete the consultation and notification requirements in accordance with Section 2 of *Directive 056*,

   b) complete the Checklist for 21-Day Temporary Surface Pipelines for Well Testing (temporary pipeline checklist),

   c) provide an explanation and documented evidence to support the yes or no statements in the temporary pipeline checklist, and

   d) submit the information to the ERCB Field Centre in whose area the proposed temporary surface pipeline is to be located.

3) The licensee must have the ERCB's approval to construct and operate the temporary surface pipeline, along with all the supporting information described in requirement 2, at the pipeline location during construction, operation, and removal of the surface pipeline and also during the remediation and reclamation of the pipeline right-of-way.

4) The licensee that installed a temporary surface pipeline under the *Directive 077* approval process must

   a) remove the pipeline within 60 calendar days from the start of well testing, and

   b) remediate and reclaim the pipeline right-of-way within 100 calendar days from the start of well testing.

5) Except for requirement 2(a) the ERCB may alter, vary, or waive any provisions in this section either on its own motion, by providing a notice to the well licensee, or on the motion of the licensee of the well.

7.3 Interpretation

For the temporary pipeline checklist, the definition of sour service contained in Clause 16 of *CSA Z662* is used.

If a licensee that requires an approval for a temporary surface pipeline for well testing indicates NO to any item on the temporary surface pipeline checklist, the ERCB Field Centre will forward the checklist, explanation, and supporting evidence to the ERCB's

- Technical Operations Group, Pipeline Operations Section, for matters regarding technical operations, or
- Facilities Application Group for any matters regarding outstanding concerns or objections received during the consultation and notification process.

Based on the specific group's recommendation, the ERCB Field Centre will provide a disposition on the matter.

Licensees should submit the temporary pipeline checklist, explanation, and supporting evidence sufficiently in advance of pipeline construction to ensure that the appropriate ERCB group(s) has sufficient time to evaluate the application.

Pipeline construction days are not included in the 21 consecutive days for well testing.

Licensees proposing to use a temporary surface pipeline for well testing must also comply with the general requirements for surface pipelines in Sections 9 and 21 of the *Pipeline Regulation.*

7.4 References

Pipeline Act

Pipeline Regulation

Directive 056: Energy Development Applications and Schedules

Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting

CSA Z662: Oil and Gas Pipeline Systems (current edition)

ERCB Energy Resources Conservation Board

Directive 077
Checklist for 21-Day Temporary Surface Pipelines for Well Testing

Licensee (Company) Name _____

Contact Name _____ Title _____

Phone No. _____ Signature _____

Purpose _____

Location: From _____ To _____ Connected to Licence No.:_____

Line No._____

Start Date _____ Expiry Date _____

Pipe Specifications _____ OD (mm) _____ Wall Thickness (mm) _____ Length (km) _____

MOP (kPa) _____ Stress Level _____

Substance _____ H_2S Content* (mol/kmol) _____

ERCB Field Centre _____ Inspector _____

Approval Date_____

*Any proposal involving sour service specifications must be reviewed and approved by Pipeline Technical Operations.

The following is to be completed by the company contact and approved by the ERCB inspector. (See reverse for explanations.)

	Yes	No	NA
1. *Directive 056* Notification and Consultation Requirements:			
1.1 Have the applicable notification and consultation requirements in *Directive 056* been met?	____	____	
2. Material Requirements			
New Material			
2.1. Pipe, fittings, flanges, and valves will comply with the material requirements of *CSA Z662*.	____	____	
Used Material			
2.2. Pipe and components have been inspected, tested, or evaluated, and material compliance and integrity have been confirmed for the proposed service.	____	____	
3. Design / Construction / Operations			
3.1. Pipeline will comply with the requirements of the *Pipeline Regulation*, Section 21.	____	____	
3.2. Pipeline will comply with the design requirements of *CSA Z662*.	____	____	
3.3. Pipeline will comply with the installation, joining, inspection, and testing requirements of *CSA Z662*.	____	____	
3.4. Pipeline MOP will be compatible with that of other connecting pipelines.	____	____	
3.5. Corrosion mitigation procedures will be implemented.	____	____	____
3.6. H_2S content will be compatible with that of other connecting pipelines.	____	____	____
3.7. For sour service pipelines, an emergency response plan (ERP) will be implemented where required.	____	____	____
3.8. Pipeline will be monitored regularly to detect leaks and ensure public safety.	____	____	

User Notes

***CSA Z662* refers to *CSA Z662-11: Oil and Gas Pipeline Systems*.**

Temporary surface pipeline may only be used for maximum 21 days.

1. *Directive 056* Notification and Consultation Requirements

Yes means all of the applicable requirements in *Directive 056* have been met.

No means that not all of the above applicable requirements have been met.

2. Material Requirements

New Material

2.1. Yes means that all of the applicable requirements in *CSA Z662*, Clause 5: Materials, have been met.

No means that not all of the above applicable requirements have been met.

Note:

- API 5CT (J55 tubing) is allowed for nonsour service only.
- API 5LCP (coiled pipe) is allowed for sweet service and may be used for sour service if the company demonstrates that the API 5LCP coiled pipe used meets the requirements of *CSA Z662*, Clause 16, or a certificate of compliance is provided from the manufacturer or designer (P.Eng.) for the particular coiled pipe.
- The company must demonstrate that fittings, flanges, and valves intended for sour service meet the applicable *CSA Z245* series and NACE MR0175/ISO 15156-2. A certificate of compliance from the manufacturer or designer (P.Eng.) for the particular component is acceptable.

Used Material

2.2. Yes means that all of the applicable requirements in *CSA Z662*, Clause 5.6: Reuse of Materials, have been met.

No means that not all of the above applicable requirements have been met.

Note:

- Used J55 tubing is acceptable, provided that all of tubing has been fully inspected and meets API Recommended Practice 5C1, Clause 7.
- Used coiled pipe is acceptable, provided that the entire pipe has been fully inspected for damage and loss of wall thickness due to corrosion and that mechanical properties have not been affected from uncoiling and recoiling. Used coiled pipe must be fully inspected by visual inspection and either magnetic flux or eddy current method.

3. Design/Construction/Operation Requirements

3.1. Yes means that all of the applicable requirements in the *Pipeline Regulation*, Section 21, have been met.

No means that not all of the above applicable requirements have been met.

3.2. Yes means that all of the applicable requirements as outlined in *CSA Z662*, Clause 4: Design, have been met.

No means that not all of the above requirements have been met.

Note:

- The company must ensure that the pipeline has adequate flexibility to withstand expansion or contraction due to changes in ambient or production temperatures.
- The company must ensure that, where required, suitable restraints are in place to control excessive lateral and vertical movement. See the *Pipeline Regulation*, Section 21, and *CSA Z662*, Clause 4.6: Flexibility and Stress Analysis, for specific requirements.
- Threaded connections, mechanical interference fitting joints, and seal welding of threaded connections are not acceptable for sour service.
- Surface pipelines must be buried at all road and trail crossings.

3.3 Yes means that all of the applicable requirements in *CSA Z662*, Clauses 6: Installation, 7: Joining, and 8: Pressure Testing, have been met.

No means that not all of the above applicable requirements have been met.

Note:

- Welding of API 5CT (J55 tubing and others) is not acceptable.
- For sour service, welding of pipe grades greater than 386 MPa must be reviewed by the Pipeline Section.
- For sour service pipelines, all butt welds must be 100% inspected around their circumference. (See *CSA Z662*, Clause 16.9.3.)
- For nonsour service pipelines, all butt welds within the limits of a water crossing or an uncased road or railway crossing and all pressure-containing welds not subject to a pressure test in place must be nondestructively inspected. (See *CSA Z662*, Clause 7.10.3: Mandatory Nondestructive Inspection.)
- The pipeline must be hydrostatically pressure tested.
- A minimum of one hour-long pressure test is required for pipelines that are fully exposed. (See *CSA Z662*, Clause 8.7.5.)
- Pressure recorders, including recording charts, must be used to accurately record the pressures during the test (*CSA Z662*, Clause 8.7.7).

3.4. Yes means that the proposed pipeline maximum operating pressure (MOP) is the same as those of other connecting pipelines or that pressure control devices are in place to protect the pipelines from overpressure, as outlined in *CSA Z662*, Clause 4.18: Pressure Control and Overpressure Protection of Piping.

No means that the MOPs are not the same and that no pressure control devices are in place to protect the pipelines from overpressure.

3.5. Yes means that all of necessary steps have been taken to ensure that corrosion is mitigated during the temporary operating period.

No means that corrosion mitigation measures will not be in place during the temporary operating period.

N/A means that corrosion mitigation measures are not required because the pipeline is noncorrodible.

3.6. Yes means that the proposed pipeline hydrogen sulphide (H_2S) content is the same as the other connecting pipelines or that a control mechanism is in place to ensure that the proposed pipeline and other connecting pipelines are subject to the same H_2S content.

No means that H_2S content is not the same for all the pipelines and that no control mechanisms are in place to ensure that the pipelines are subject to the same H_2S content.

N/A means that the service fluid contains no H_2S.

Note: For sour service, prior to operation the company must consider removing any solids produced from the well that are trapped in the pipeline and batching the pipeline with inhibitor.

3.7. Yes means that an ERP has been established in accordance with *Directive 071*.

No means that no ERP has been established.

N/A means that the service fluid contains no H_2S.

3.8. Yes means that all precautions have been taken to ensure that the pipeline will be regularly monitored for leaks and vandalism.

No means that the pipeline will not be monitored for leaks or vandalism.

Note: Depending on its location and substance, the operator may be required to monitor the pipeline 24 hours a day (*Pipeline Regulation*, Section 21).

Part B Reference Tools

1 Interpretation of Jurisdictional Relationships for Pipeline, Pressure Equipment, and Pressure Piping

1.1 Background

This Interpretation of Jurisdictional Relationships for Pipeline, Pressure Equipment, and Pressure Piping is intended to aid in the interpretation of the interrelationships of the *Oil and Gas Conservation Act* and *Regulations*, the *Pipeline Act* and *Regulation*, the *Safety Codes Act* and *Pressure Equipment Safety Regulation*, and *CSA Z662: Oil and Gas Pipeline Systems*.

The eleven simplified illustrations of example facilities are for general information purposes only and do not replace the requirements and details in the applicable acts, regulations, and standards. Although every effort has been made to ensure that the information provided is accurate, the user is still responsible for ensuring that the facility or pipeline complies with all requirements, irrespective of the information provided herein.

Definitions of selected items are given following Figure 11.

This version supersedes the *Reference Tool for Interpreting Jurisdictional Relationships for Pipeline, Pressure Equipment, and Pressure Piping* of June 2006, as originally appended to *Directive 056*.

This "interpretation" applies to all oil and gas pipelines in Alberta other than

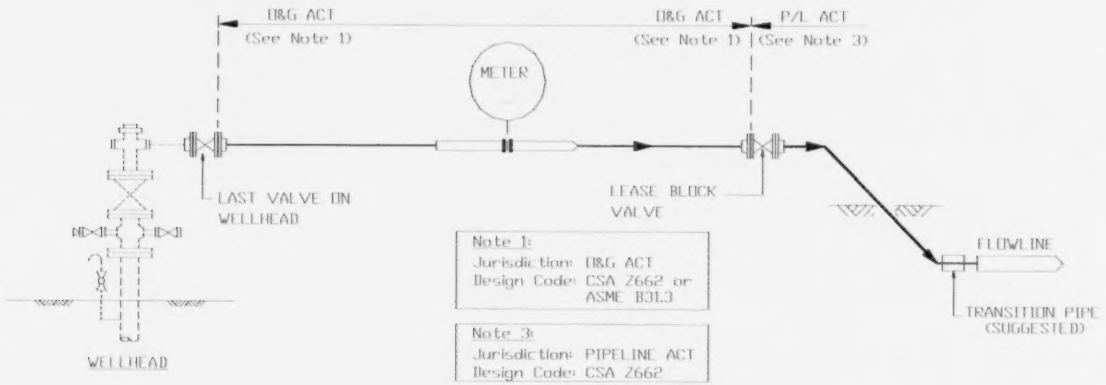
- a pipeline situated wholly within the property of a refinery, processing plant, coal processing plant, marketing plant, or manufacturing plant;
- a pipeline within National Energy Board jurisdiction;
- a gas or oil fuel pipe wholly within the property of a consumer;
- a boiler, pressure vessel, or pressure piping system within the meaning of the definitions under the *Safety Codes Act*; and
- low-pressure gas distribution pipelines.

Note the following:

- When several pipelines enter into a manifold, the jurisdictional break may be on individual inlet pipelines on the header or at the common header piping inlet to the facility, depending on the location of the block valve(s).
- Pig traps or scraper traps in the pipeline are specifically excluded from the *Pressure Equipment Safety Regulation* under the *Safety Codes Act*. Pig traps or scraper traps when constituting part of a pipeline are to be built in accordance with the requirements of *CSA Z662*.
- Design and licensing requirements of the wellhead are not covered in this document. Refer to the *Oil and Gas Conservation Act*. If only a single valve is shown on the wellhead outlet, that valve is considered part of the wellhead.
- Other than a single valve on the wellhead outlet, the last valve before a pipeline leaves the lease is generally considered to be included under *Pipeline Act* jurisdiction.
- Piping designated as being under the *Oil and Gas Conservation Act* may be designed and built as either *ASME B31.3* piping or *CSA Z662* piping.

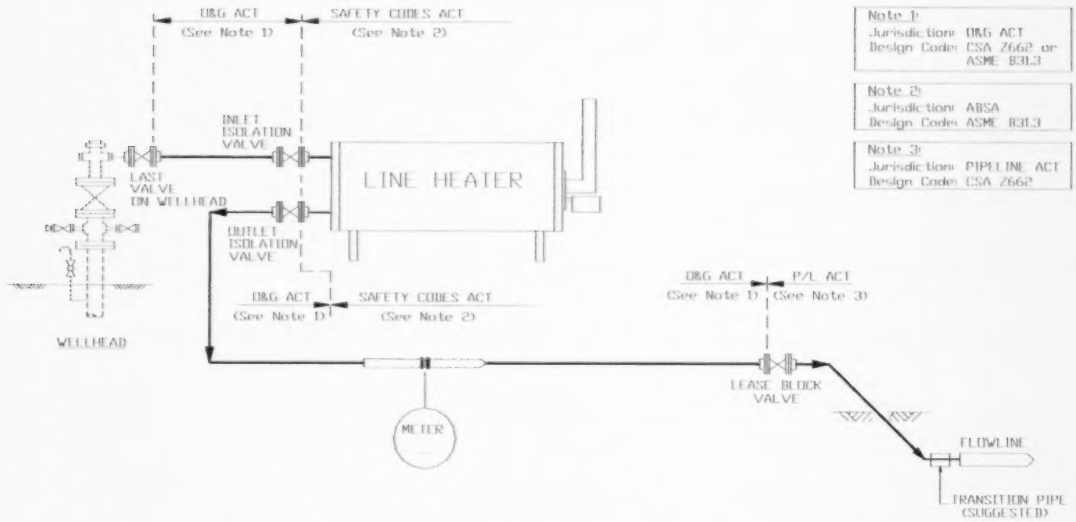
1.2 Figures

Figure 1. Well site with no dehydrator or separator, with or without a lease block valve, including a pipeline leaving the well site



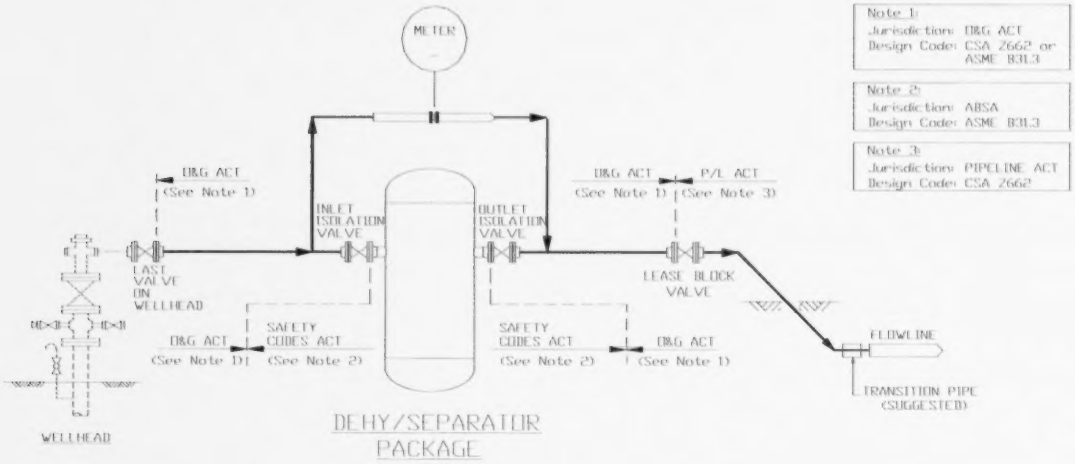
Licence Jurisdiction:	*Oil and Gas Conservation Act* and *Regulations*: Well site facilities *Pipeline Act and Regulation*: Pipeline
Licensing Requirements:	Pipeline leaving the lease from the lease block valve is covered under the *Directive 056*, Schedule 3, application for a pipeline licence. If the lease block valve is part of the wellhead, the *Pipeline Act* applies from that point.
Design Jurisdiction (Design Review and Acceptance):	ERCB: piping from the wellhead, including the lease block valve and, leaving the lease boundary
Design Code / Code of Construction:	*CSA Z662* or *ASME B31.3*: Piping from wellhead to lease block valve *CSA* Z662: Pipeline from lease block valve
Comments:	Metering is included in the *Oil and Gas Conservation Regulation*.

Figure 2. Well site with well site heater, with or without a lease block valve, including a pipeline leaving the well site



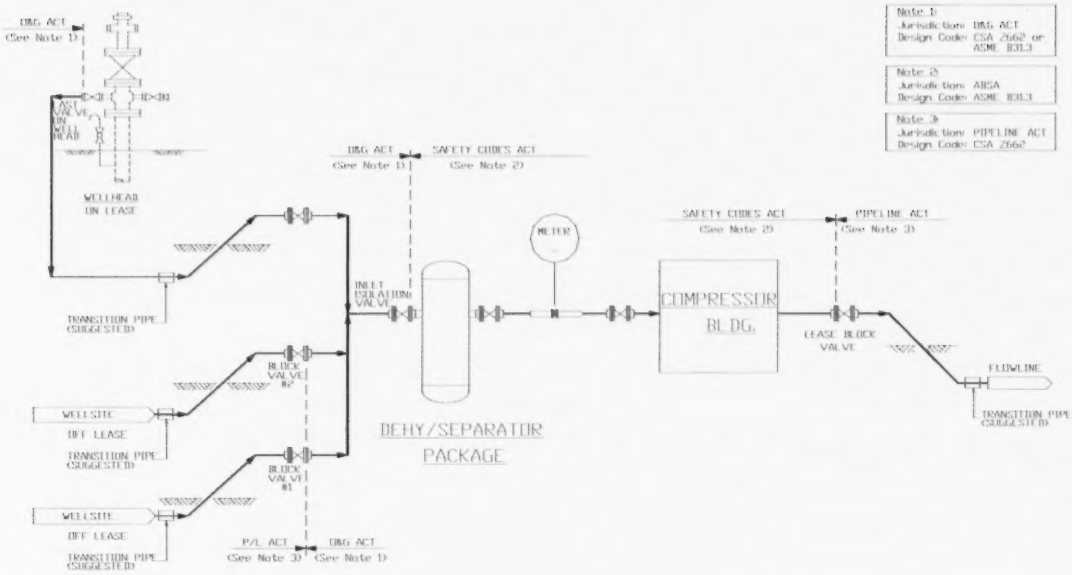
Licence Jurisdiction:	*Oil and Gas Conservation Act* and *Regulations*: Well site facilities *Pipeline Act* and *Regulation*: Pipeline
Licensing Requirements:	Piping from the wellhead (after the last valve on the wellhead) to the line heater inlet isolation valve is covered under the *Directive 056*, Schedule 2, application for a facility licence. Pipeline leaving the lease boundary from the lease block valve is covered under the *Directive 056*, Schedule 3, application for a pipeline. If the lease block valve is located at the heater outlet, the pipeline leaving that valve is covered under a *Directive 056*, Schedule 3, application for a pipeline.
Design Jurisdiction (Design Review and Acceptance):	ERCB: Piping from the wellhead to the inlet flange on the well site heater and from the outlet flange leaving the heater to the lease block valve ABSA: Well site heater coil ERCB: Pipeline from the lease block valve and leaving the lease boundary
Design Code / Code of Construction:	*CSA Z662* or *ASME B31.3*: Piping from the wellhead to the inlet flange on the well site heater and from the outlet flange leaving the heater to the lease block valve *CSA B51*: Well site heater coil from inlet flange to outlet flange *CSA Z662*: Pipeline leaving the lease boundary
Comments:	Regardless of length, if a pipeline covered by the *Pipeline Act* leaves the lease boundary, a pipeline licence is required.

Figure 3. Well site with a dehydrator and/or separator, with or without a lease block valve, including a pipeline leaving the well site



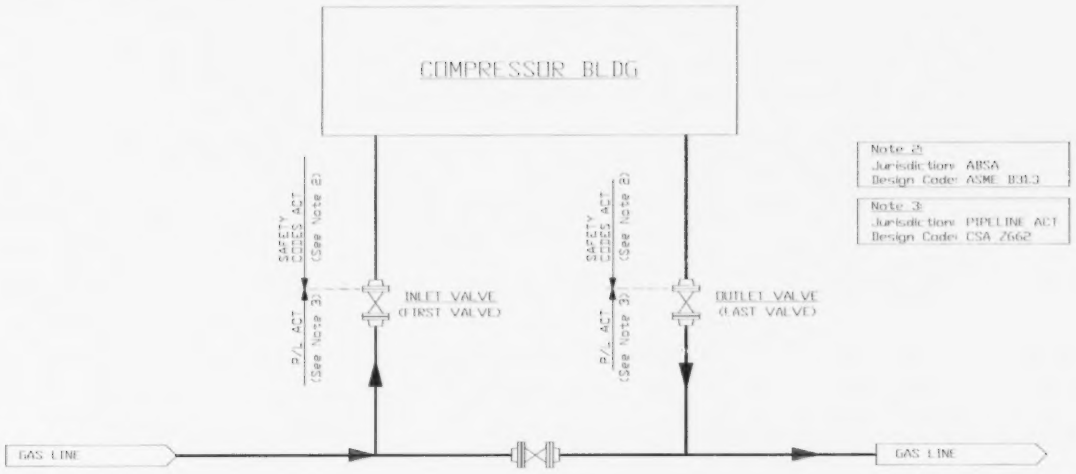
Licence Jurisdiction:	*Oil and Gas Conservation Act* and *Regulations*: Well site facilities *Pipeline Act* and *Regulation*: Pipeline
Licensing Requirements:	Piping from the wellhead (after the last valve on the wellhead) is covered under the *Directive 056*, Schedule 2, application for a facility licence. Pipeline from the lease block valve leaving the lease boundary is covered under the *Directive 056*, *Schedule* 3, application for a pipeline.
Design Jurisdiction (Design Review and Acceptance):	ERCB: Piping from the wellhead to the inlet valve on the dehydrator and/or separator; after the discharge, outlet valve leaving the dehydrator and/or separator up to the lease block valve ABSA: Piping and vessels between the inlet and discharge valves on the dehydrator and/or separator ERCB: Pipeline from the lease block valve leaving the lease boundary
Design Code / Code of Construction:	*CSA Z662* or *ASME B31.3*: Piping after the last valve on the wellhead to the inlet valve on the dehydrator and/or separator; after the discharge, the outlet valve leaving the dehydrator and/or separator up to the lease block valve *CSA B51*: Dehydrators, separators, and all associated piping are designed and built to *CSA B51* standards. *CSA B51* refers to *ASME B31.3* for piping design. *CSA Z662*: Pipeline leaving the lease boundary
Comments:	Since the wellhead lease is not considered a "processing plant" under the *Pipeline Regulation*, only the pipe between adjacent pressure vessels is considered a "pressure piping system," and the pressure vessels together with the pressure piping system constitute a "pressure plant" under the *Pressure Equipment Safety Regulation*. Regardless of length, if a pipeline portion covered by the *Pipeline Act* leaves the lease boundary, a pipeline licence is required.

Figure 4. Gas satellite or group gas gathering facility



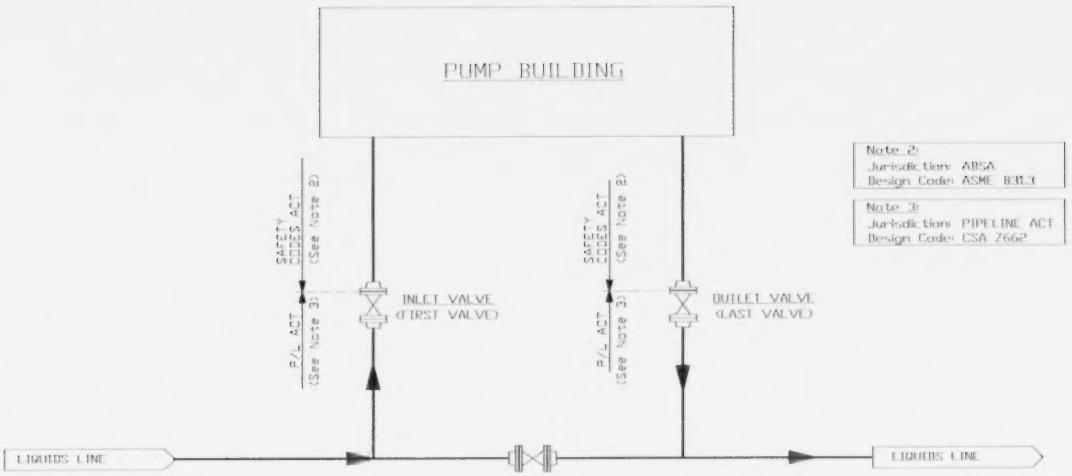
Licence Jurisdiction:	*Oil and Gas Conservation Act* and *Regulations*: Gas battery *Pipeline Act* and *Regulation*: Pipelines
Licensing Requirements:	Piping from a wellhead(s) for an off-lease well to the block valve (#1 and #2) on the manifold upstream of the dehy/separator package is covered under the *Directive 056*, Schedule 3, application for a pipeline. Piping from an on-lease well is covered under the *Directive 056*, Schedule 2, facility licence application. Piping from an on-lease well from the last valve on the wellhead, and, piping from the isolation valve on the manifold upstream of the dehy/separator package, meter run, and compressor package through to the last valve on the lease (lease block valve) is covered under the *Directive 056*, Schedule 2, application for a facility licence. Cases where there is only a piping junction and no vessels, are covered under the *Directive 056*, Schedule 3, application for the pipeline. Pipeline from the lease block valve leaving the lease boundary is covered under the *Directive 056*, Schedule 3, application for a pipeline.
Design Jurisdiction (Design Review and Acceptance):	ERCB: Piping from the wellhead(s) to the block valve on the manifold upstream of the dehy/separator package ABSA: Dehydrators, separators, and all associated piping are designed and built to *CSA B51* standards for the dehy/separator package, meter run, and compressor package through to the last valve on the lease (lease block valve). *CSA B51* refers to *ASME B31.3* for piping design. ERCB: Pipeline leaving the lease boundary
Design Code / Code of Construction:	*CSA Z662*: Pipeline from an off-lease wellhead(s) to the block valve on the manifold upstream of the dehy/separator package *CSA Z662* or *ASME B31.3*: Piping from an on-lease wellhead(s) to the block valve on the manifold upstream of the dehy/separator package *CSA B51*: Dehydrators, separators, and all associated piping are designed and built to *CSA B51* standards for the dehy/separator package, meter run, and compressor package through to the last valve on the lease (lease block valve). *CSA B51* refers to *ASME B31.3* for piping design. *CSA Z662*: Pipeline leaving the lease boundary

Figure 5. Compressor station



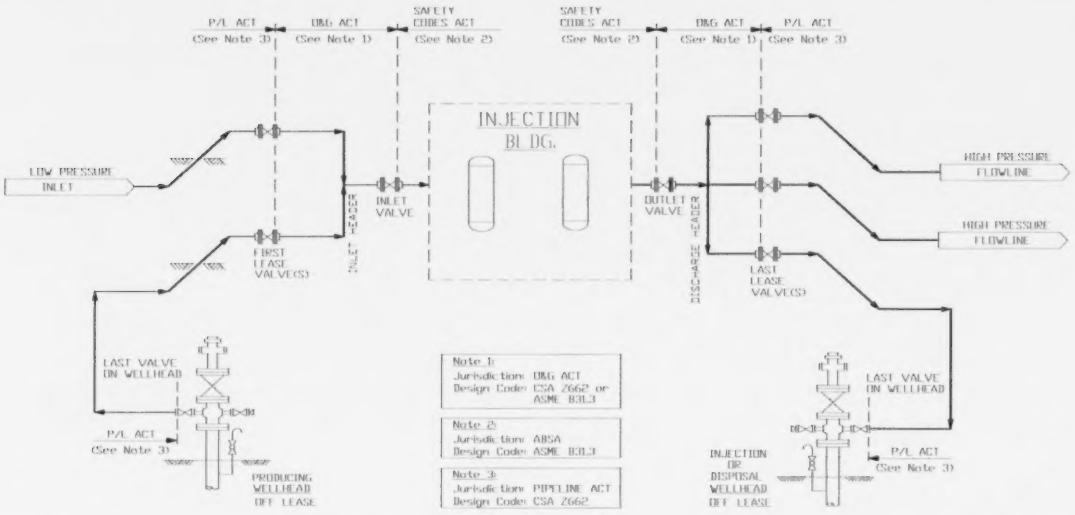
Licence Jurisdiction:	*Oil and Gas Conservation Act* and *Regulations*: Upstream of compressor station *Pipeline Act* and *Regulation*: Pipelines; downstream of compressor station
Licensing Requirements:	Pipeline entering the compressor station to the inlet or first valve on the manifold upstream of the compressor station is covered under the *Directive 056*, Schedule 3, application for a pipeline. In the case of a production (upstream) pipeline, piping from the inlet (isolation) valve on the manifold upstream of the compressor station through to the last valve on the compressor station lease (last block valve) is covered under the *Directive 056*, Schedule 2, application for a facility licence. For a transmission (downstream) pipeline, piping from the inlet (isolation) valve on the manifold upstream of the compressor station through to the last valve on the compressor station lease (lease block valve) is covered under the *Directive 056*, Schedule 3, application for a pipeline installation licence. Pipeline leaving the compressor station lease boundary is covered under the *Directive 056*, Schedule 3, application for a pipeline.
Design Jurisdiction (Design Review and Acceptance):	ERCB: Pipeline entering the compressor station to the inlet valve on the manifold upstream of the compressor station ABSA: Separators, other vessels, and all associated piping, including interconnecting piping, are designed and built to *CSA B51* standards for the compressor station through to the last valve on the lease (lease block valve). *CSA B51* refers to *ASME B31.3* for piping design. ERCB: Outlet valve and pipeline leaving the compressor station lease boundary
Design Code / Code of Construction:	*CSA Z662*: Pipeline entering the compressor station up to the inlet valve on the manifold upstream of the compressor station; from the outlet valve and the pipeline leaving the lease boundary *CSA B51*: Pressure vessels and all associated piping, including interconnecting piping, are designed and built to *CSA B51* standards for the compressor station through to the last valve on the lease (lease block valve). *CSA B51* refers to *ASME B31.3* for piping design. *CSA Z662*: pipeline leaving the compressor station lease boundary
Comments:	*CSA Z662* permits the use of *ASME B31.3* to design pressure piping systems for compressor stations. If no vessels or equipment meeting the definitions of the *Safety Codes Act* exist in the compressor station, it may be possible to use *CSA Z662* design throughout.

Figure 6. Pump building



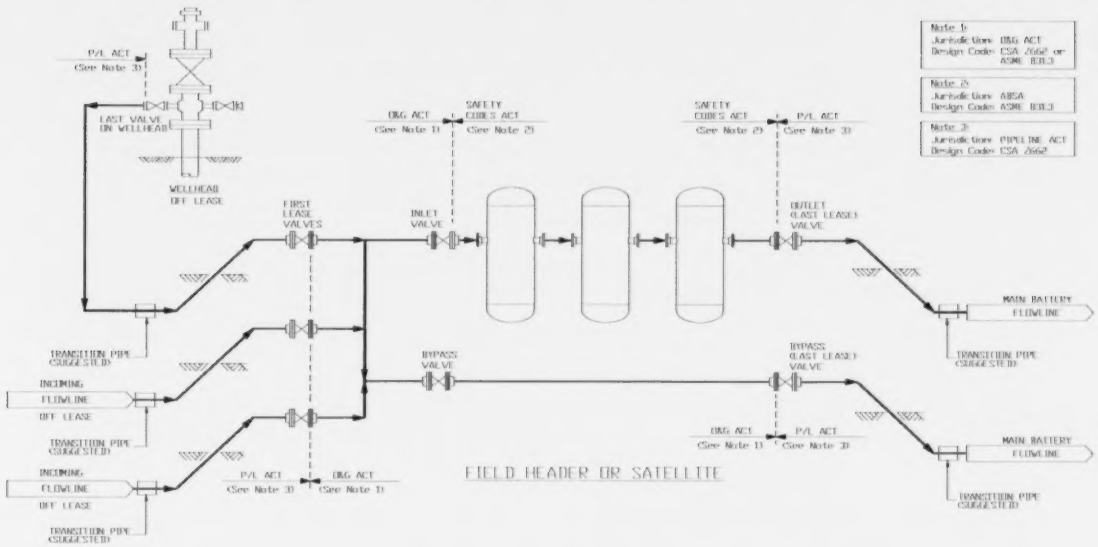
Licence Jurisdiction:	*Oil and Gas Conservation Act* and *Regulations*: Upstream of pump building *Pipeline Act* and *Regulation*: Pipelines; downstream of pump building
Licensing Requirements:	Pipeline entering the lease site to the inlet block valve (first valve) upstream of the pump building is covered under the *Directive 056*, Schedule 3, pipeline licence application. In the case of a production (upstream) pipeline, piping from the inlet isolation valve upstream of the pump building through to the last valve on the pump building lease (lease block valve) (outlet or last valve) is covered under the *Directive 056*, Schedule 2, application for facility licence. For a transmission (downstream) pipeline, piping from the outlet isolation valve upstream of the pump building through to the last valve on the pump building lease (lease block valve) is covered under the *Directive 056*, Schedule 3, application for a pipeline installation licence. Pipeline leaving the pump building lease boundary is covered under the *Directive 056*, Schedule 3, application for a pipeline.
Design Jurisdiction (Design Review and Acceptance):	ERCB: Pipeline entering the pump building to the block valve upstream of the pump building ABSA: Separators, other vessels, and all associated piping, including interconnecting piping, are designed and built to *CSA B51* standards for the pump building through to the last valve on the lease (lease block valve). *CSA B51* refers to *ASME B31.3* for piping design. ERCB: Pipeline leaving the pump building lease boundary
Design Code / Code of Construction:	*CSA Z662*: Pipeline entering the pump building up to the block valve upstream of the pump building *CSA B51*: Pressure vessels and all associated piping, including interconnecting piping, are designed and built to *CSA B51* standards for the pump building through to the last valve on the lease (lease block valve). *CSA B51* refers to *ASME B31.3* for piping design *CSA Z662* for the pipeline leaving the pump building lease boundary.
Comments:	*CSA Z662* permits the use of *ASME B31.3* to design pressure piping systems for pump stations. If no vessels or equipment meeting the definitions of the *Safety Codes Act* exist in the pump station, it may be possible to use *CSA Z662* design throughout.

Figure 7. Source water collection, injection, and disposal—wells are off lease



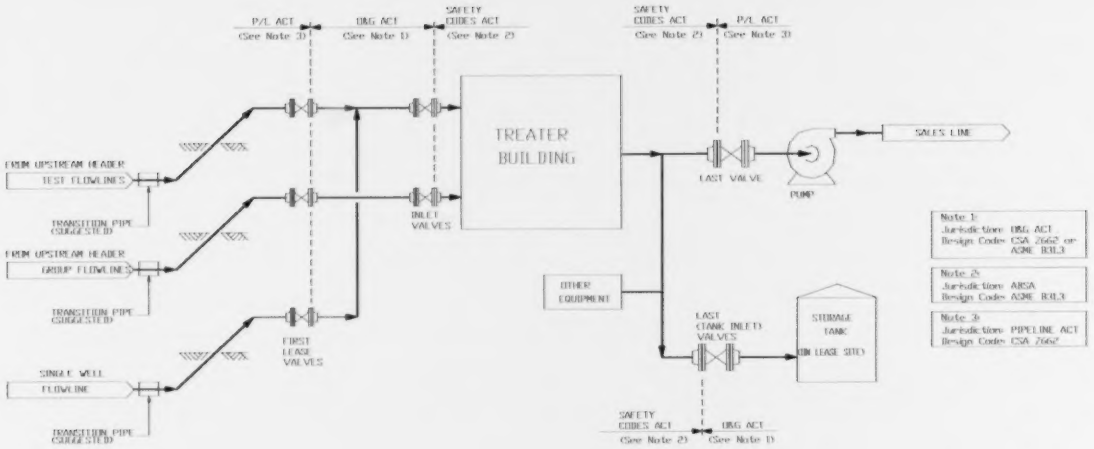
Licence Jurisdiction:	*Oil and Gas Conservation Act* and *Regulations*: Injection Facility *Pipeline Act* and *Regulation*: Pipelines
Licensing Requirements:	Pipeline from off-lease water well site to the first lease valve at the injection facility unit is covered by *Directive 056*, Schedule 3, application for a pipeline. Disposal well site (off lease): is covered by *Directive 056*, Schedule 3, application for a pipeline, from the injection facility last lease valve to the lease block valve on the disposal well site (i.e., lease block valve on lease or wellhead) The produced water pipeline entering the injection facility unit to the lease valve on the inlet header upstream of the injection facility unit lease boundary is covered under the *Directive 056*, Schedule 3, pipeline licence application. Piping from the lease valve on the discharge header upstream of the injection facility building through to the last lease valve on the injection facility is covered under the *Directive 056*, Schedule 2, application for a facility licence.
Design Jurisdiction (Design Review and Acceptance):	ERCB: Pipeline entering the injection facility to the lease valve on the inlet header upstream of the injection facility ABSA: All pressure vessels and pressure plant piping are designed and built to *CSA B51* standards for the injection facility unit. *CSA B51* refers to *ASME B31.3* for piping design. Piping falling under the *Oil and Gas Conservation Act* can be designed to *CSA Z662* or *ASME B31.3* standards. ERCB: Pipeline leaving the injection facility unit lease boundary from the last valve on the discharge header.
Design Code / Code of Construction:	*CSA Z662*: Pipeline entering the injection facility unit to the inlet valve on the inlet header upstream of the injection facility *CSA B51*: All pressure vessels and pressure plant piping are designed and built to *CSA B51* standards for the injection facility unit. *CSA B51* refers to *ASME B31.3* for piping design. Piping falling under the *Oil and Gas Conservation Act* can be designed to *CSA Z662* or *ASME B31.3* standards. *CSA Z662*: Pipeline leaving the injection facility unit lease boundary from the last valve on the discharge header.
Comments:	Typically, all piping within the injection facility contains nonexpansible fluid; however, if any vessels or piping is associated with expansible fluids, these facilities must be designed to *CSA B51* and *ASME B31.3* standards.

Figure 8. Oil/gas satellite with field header to group pipelines



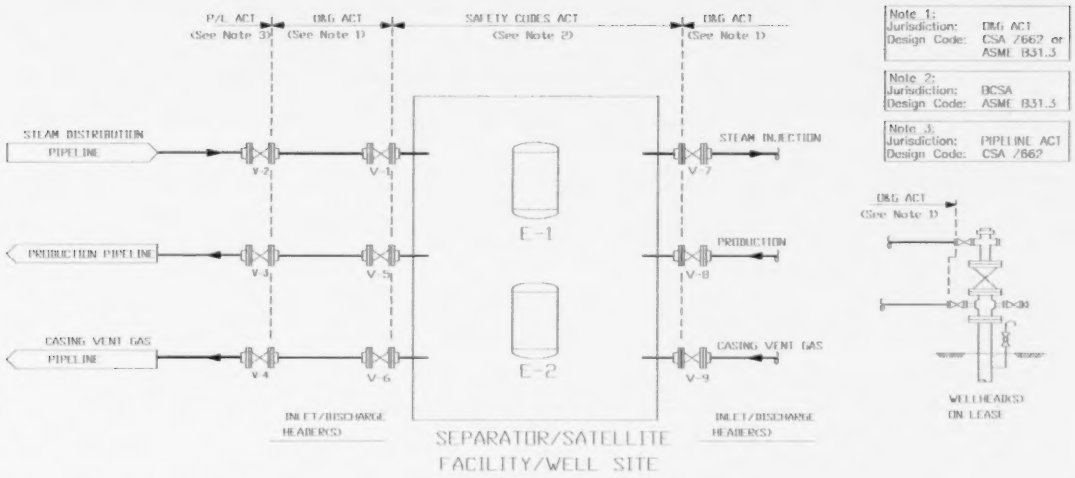
Licence Jurisdiction:	*Oil and Gas Conservation Act* and *Regulations*: Oil/gas satellite *Pipeline Act* and *Regulation*: Pipelines
Licensing Requirements:	Pipeline entering the oil/gas satellite to the inlet valve on the header upstream of the oil/gas satellite lease boundary is covered under the *Directive 056*, Schedule 3, application for a pipeline. Vessels and piping from the first lease valves on the manifold upstream of the oil/gas satellite building through to the last valve on the oil/gas satellite lease (last lease valves) are covered under the *Directive 056*, Schedule 2, application for a facility licence. Cases where there is only a piping junction and no vessels are covered under the *Directive 056*, Schedule 3 application for a pipeline. Pipeline leaving the oil/gas satellite lease boundary is covered under the *Directive 056*, Schedule 3, application for a pipeline.
Design Jurisdiction (Design Review and Acceptance):	ERCB: Pipeline entering the oil/gas satellite to the inlet valve on the header upstream of the oil/gas satellite ABSA: All pressure vessels and pressure plant piping are designed and built to *CSA B51* standards for the oil/gas satellite. *CSA B51* refers to *ASME B31.3* for piping design. ERCB: Pipeline leaving the oil/gas satellite lease boundary ERCB: For cases with no pressure vessels or other *Safety Codes Act* equipment, all piping will be designed and built to *CSA Z662* standards.
Design Code / Code of Construction:	*CSA Z662*: Pipeline entering the oil/gas satellite to the inlet valve on the header upstream of the oil/gas satellite *CSA B51*: All pressure vessels and pressure plant piping, including interconnecting piping, are designed and built to *CSA B51* standards for the oil/gas satellite. *CSA B51* refers to *ASME B31.3* for piping design. Piping falling under the *Oil and Gas Conservation Act* can be designed to *CSA Z662* or *ASME B31.3* standards. *CSA Z662*: Cases with no pressure vessels and only piping, including interconnecting piping, are designed and built to *CSA Z662* standards. *CSA Z662*: Pipeline leaving the oil/gas satellite lease boundary

Figure 9. Oil battery facility



Licence Jurisdiction:	*Oil and Gas Conservation Act* and *Regulations*: Oil battery *Pipeline Act* and *Regulation*: Pipelines
Licensing Requirements:	Pipeline entering the oil battery unit to the first lease valve(s) on the manifold upstream of the oil battery is covered under the *Directive 056*, Schedule 3, application for a pipeline. Piping after the first lease valve on the manifold upstream of the oil battery through to the last valve on the oil battery lease (to lease block valve if leaving the site, or to tank inlet valve if to on-lease storage) is covered under the *Directive 056*, Schedule 2, application for a facility licence. Pipeline leaving the oil battery unit lease boundary is covered under the *Directive 056*, Schedule 3, application for a pipeline.
Design Jurisdiction (Design Review and Acceptance):	ERCB: Pipeline entering the oil battery unit to the inlet valve(s) on the manifold upstream of the oil battery unit lease boundary ABSA: All pressure vessels and pressure plant piping are designed and built to *CSA B51* standards for the oil battery unit through to the last valve on the lease (lease block valve). *CSA B51* refers to *ASME B31.3* for piping design. ERCB: Pipeline leaving the oil battery unit lease boundary
Design Code / Code of Construction:	*CSA Z662*: Pipeline entering the oil battery unit to the first lease valve(s) on the manifold upstream of the oil battery *CSA B51*: All pressure vessels and pressure plant piping are designed and built to *CSA B51* standards for the oil battery unit through to the last valve on the lease (lease block valve). *CSA B51* refers to *ASME B31.3* for piping design. *CSA Z662*: Pipeline leaving the oil battery unit lease boundary
Comments:	In this sketch the sales line pump is *CSA* and the pump is considered to be a pipeline installation for licensing purposes. It would also be possible to include the pump as part of the battery design, in which case the pump could use B31.3 design, in accordance with the *O&G Act*. If the oil storage tank was off-lease, it would require a Schedule 3 pipeline to connect to it.

Figure 10. Heavy oil / in situ steam flood facilities

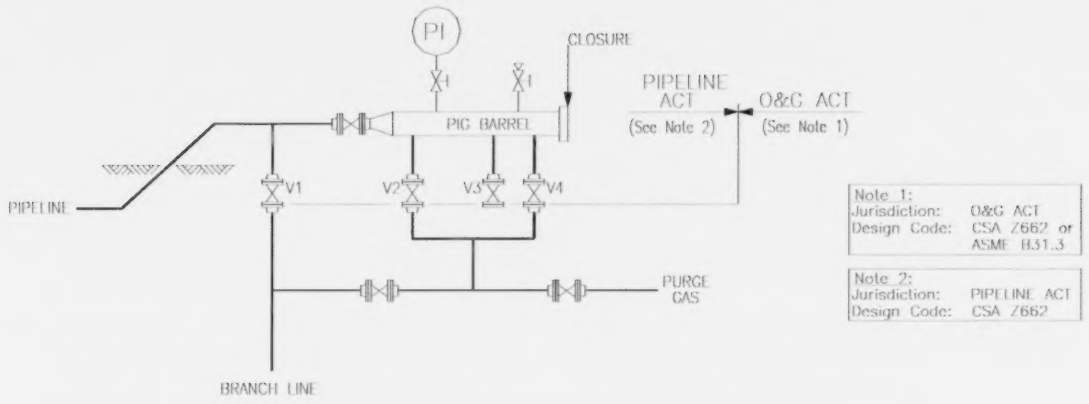


Licence Jurisdiction:	*Oil and Gas Conservation Act* and *Regulations*: Production piping, casing vent gas piping, steam distribution piping, well site pad, and wells *Pipeline Act* and *Regulation*: Pipelines
Licensing Requirements:	The steam distribution pipeline leaving an off-lease steam generation facility unit to the well site pad is covered under the *Directive 056*, Schedule 3, application for a pipeline. The production pipelines and casing vent gas pipelines leaving the well site pad are covered under the *Directive 056*, Schedule 3, application for a pipeline. The production piping, casing vent gas piping, and steam distribution piping from the wellhead to the last valve on the well site pad are covered under the *Directive 056*, Schedule 2, application for a facility licence. Cases where there is only piping and no vessels are covered under the *Directive 056*, Schedule 3, application for the pipelines.
Design Jurisdiction (Design Review and Acceptance):	ERCB/ABSA: For the steam distribution pipeline, the design review and acceptance is a joint ABSA and ERCB jurisdiction. The ERCB approves and issues a pipeline licence based on ABSA design review and registration. ERCB: For the production and casing vent gas pipelines leaving the well site pad, the design jurisdiction is the *Pipeline Act*. ABSA: For the steam distribution, production, and casing vent gas piping and vessels and associated piping between the inlet and discharge valves on the separator. All pressure vessels and associated piping are designed and built to *CSA B51* standards. *CSA B51* refers to *ASME B31.3* for piping design. ERCB: For the production piping, casing vent gas piping, and steam distribution piping on the wellhead through to the inlet valve on the pad satellite building (V7, V8, V9), the design jurisdiction is the *Oil and Gas Conservation Act*.
Design Code / Code of Construction:	*CSA Z662*, Clause 14: Steam Distribution Pipelines: Pipeline leaving the steam generation facility unit to the steam well site pad *CSA Z662*: For the production and casing vent gas pipelines leaving the well site pad, the design is to *CSA Z662*. *CSA B51*: All pressure vessels and pressure plant piping in the separation facility are designed and built to *CSA B51* standards up to the discharge valve leaving the separator. *CSA B51* refers to *ASME B31.3* for piping design. *CSA Z662* or *B31.1*: Piping from the wellhead valve to inlet of well site pad

(continued)

	Since the well site pad lease is not considered a processing plant under the *Pipeline Regulation*, only the piping between adjacent pressure vessels is considered a "pressure piping system," and the pressure vessels together with the pressure piping system constitute a "pressure plant" under the *Pressure Equipment Safety Regulation*. *CSA Z662* or *ASME B31.3*: For steam distribution piping from the discharge header of the well site pad to the wellhead, the design code is to *CSA Z662* or *ASME B31.3* standards, depending on whether the piping goes off lease or not (on lease: *B31.3*, off-lease *CSA Z662*. *CSA Z662* or *ASME B31.3*: For production and casing vent gas piping from the wellhead to the inlet header in the satellite building, the design code is to *CSA Z662* or *ASME B31.3* standards. *CSA Z662*: Cases with no pressure vessels and only piping, including interconnecting piping, may be designed and built to *CSA Z662* or *ASME B31.3* standards.
Comments:	If there is common steam injection and production piping, the steam injection piping must meet *CSA Z662*, Clause 14, standards, and the design must be reviewed by ABSA.

Figure 11. Pig barrel design/jurisdiction



Licence Jurisdiction:	*Oil and Gas Conservation Act* and *Regulations*: Well site facilities *Pipeline Act* and *Regulation*: Pipeline and pig barrel (and valves V1, V2, V3, and V4)
Licensing Requirements:	Pipeline leaving the lease, including the pig barrel and valves V1, V2, V3, and V4 for the pig barrel, is covered under the *Directive 056*, Schedule 3, application for a pipeline licence.
Design Jurisdiction (Design Review and Acceptance):	ERCB: For pipeline, pig barrel, and closure
Design Code / Code of Construction:	Piping shown as "branch line and purge gas" from the isolation valves on this figure is shown as being covered under the *Oil and Gas Conservation Act*. However, depending on the location and purpose of the pig barrel, the design code/code of construction may change. For example: *CSA Z662* or *ASME B 31.3* - At well sites: Wellhead to lease block valve/isolation valves. *CSA Z662* - At pipeline junctions. *ASME B 31.3*.- Inside plant facilities: The licence jurisdiction could be the *Safety Codes Act* and the design code/code of construction is *ASME B31.3*. Closure: *CSA Z662*, Clause 4.3.13.1, requires the closure to be *ASME S.8* Div 1
Comments:	Barrel: Z662 design and construction; barrel is a "component," as per *CSA Z662*. For welding the barrel, *CSA Z662*, Clause 7, provides the option to design and weld to *ASME B31.3* standards; however, when in a pipeline application, *CSA Z662* (see Clauses 7.2 and 16.6) imposes additional requirements for sour service beyond those specified in *B31.3*. Depending on individual piping arrangements, typical pig barrel designs may constitute an exception to the "first valve on lease" rule as there may be an additional valve(s) before the pig barrel. Such a situation would not delineate the jurisdictional break, as the pig barrel is fully part of the pipeline.

1.3 Definitions

ABSA	Alberta Boilers Safety Association
Accepted	Registered and accepted by the regulatory authority
ASME	American Society of Mechanical Engineers
CSA Standard B51	Boiler, Pressure Vessel, and Pressure Piping Code
Design	Calculations, drawings, specifications, specimen, models
Directive 056	Directive 056: Energy Development Applications and Schedules
ERCB	Energy Resources Conservation Board
O&G Act	Oil and Gas Conservation Act
Pipe	A tubular product manufactured in accordance with a pipe specification or standard
Pipeline	A pipe used to convey a substance or combination of substances, including installations associated with the pipe
Piping	Pipe or pipeline contained on the lease site; may or may not be located above ground
P/L	Pipeline
Pipeline system	Pipelines required for the measurement, processing, storage, and transportation of oil or gas industry fluids
Pressure piping system	Pipe, tubes, conduits, fittings, gaskets, bolting, and other components that make up a system for the conveyance of an expansible fluid under pressure and may also control the flow of that fluid (ABSA definition)
Pressure plant	A pressure vessel or a system or arrangement of pressure vessels and pressure piping system used in connection with the pressure vessel, the system of pressure vessels, or the arrangement of pressure vessels (ABSA definition)
Pressure vessel	A vessel used for containing, storing, distributing, processing, or otherwise handling an expansible fluid under pressure (ABSA definition)
Processing plant	A plant for extracting hydrogen sulphide, helium, ethane, natural gas liquids, or other substances from gas, but does not include a wellhead separator, treater, or dehydrator
Pump unit	A facility used to pump oil industry fluids, including pumps, drivers, controls, piping, and other appurtenances

1.4 References

ASME B31.3: Process Piping Code

CSA Z662: Oil and Gas Pipeline Systems

CSA B51: Boiler Pressure Vessel and Pressure Piping Guide

ERCB *Directive 056: Energy Development Applications and Schedules*

Oil and Gas Conservation Act and *Regulations*

Pipeline Act and *Regulation*

Safety Codes Act

2 Strength and Leak Pressure Testing of Pipelines Using Gaseous Test Media

2.1 Background

This section replaces and rescinds *Informational Letter (IL) 2002-02: Strength and Leak Pressure Testing of Pipelines Using Gaseous Test Media*. It addresses requests to the ERCB for clarification of the requirements governing gaseous media pressure testing of pipelines. Gaseous media pressure testing is allowable in some instances if operators comply with the requirements detailed in the *Pipeline Act* and *Regulation* (2005) and *CSA Standard Z662: Oil and Gas Pipeline Systems* (2007).

The ERCB prefers that water be used as the pressure test medium in order to achieve the highest level of safety during the process and to obtain reliable leak test data. However, there may be circumstances where testing with a gaseous media can be justified. As stated in *CSA Z662*, Clause 8.4.3, used (salvaged) pipe may not be tested with gaseous media.

Gaseous media testing is not recommended for high-pressure pipelines located in densely populated areas.

An explanation of how the ERCB applies the requirements of the *Pipeline Regulation*, Part 3, and *CSA Z662* for the specific requirements relating to gaseous media pressure testing is provided below in Section 3.4. Note that the cited documents, including the pertinent sections of *CSA Z662*, must be reviewed in their entirety before planning or conducting gaseous media pressure testing. The pertinent sections of *CSA Z662* are

- 8: Pressure testing
- 10: Operating, maintenance and upgrading
- 12: Gas distribution systems
- 13: Reinforced composite, thermoplastic, -lined, and polyethylene pipelines
- 15: Aluminum piping

If there is a discrepancy between *CSA Z662* or the *Pipeline Regulation* and this section of *Directive 077*, the requirements in *CSA Z662* and the *Pipeline Regulation* prevail.

The following sections summarize the issues that should be considered in planning a gaseous media test, including a compilation of existing requirements and guidance on how to meet the requirements.

2.2 ERCB Field Centre Notification and Responsibility

The appropriate ERCB Field Centre must be notified via the Digital Data Submission (DDS) system at least 48 hours prior to the commencement of any pressure test. If in any situation an ERCB inspector believes that a gaseous media pressure test might be inappropriate or constitute a safety hazard to personnel or the community, the inspector may place a hold on the test until any concerns have been resolved.

2.3 Integrity Management for Existing Pipelines

The pipeline operator must perform an engineering assessment (*CSA Z662*, Clause 10.14.6) and must confirm the pipeline integrity prior to resuming operation if the pipeline

- has been discontinued or abandoned (*CSA Z662*, Clause 10.16.2: Reactivation of piping, and *Pipeline Act*, Section 85),

- has otherwise been out of operation for longer than one year, or
- is being requalified.

For existing pipelines, a detailed proposal and testing procedure must be submitted to the ERCB Pipeline Operations, using the e-mail address pipelineoperations@ercb.ca, for approval prior to the test regardless of pipeline volume if

- there is known or suspected corrosion or any other condition that could potentially cause the pipeline to break during testing, and
- in situations where hydrostatic testing may not be feasible or additional pipeline integrity information and an engineering assessment indicates that gaseous media pressure testing may be possible.

2.4 Criteria for Using Gaseous Media for Pressure Testing

The preferred pressure-test medium is water, followed by water with freezing-point depressant, followed by gaseous test media.

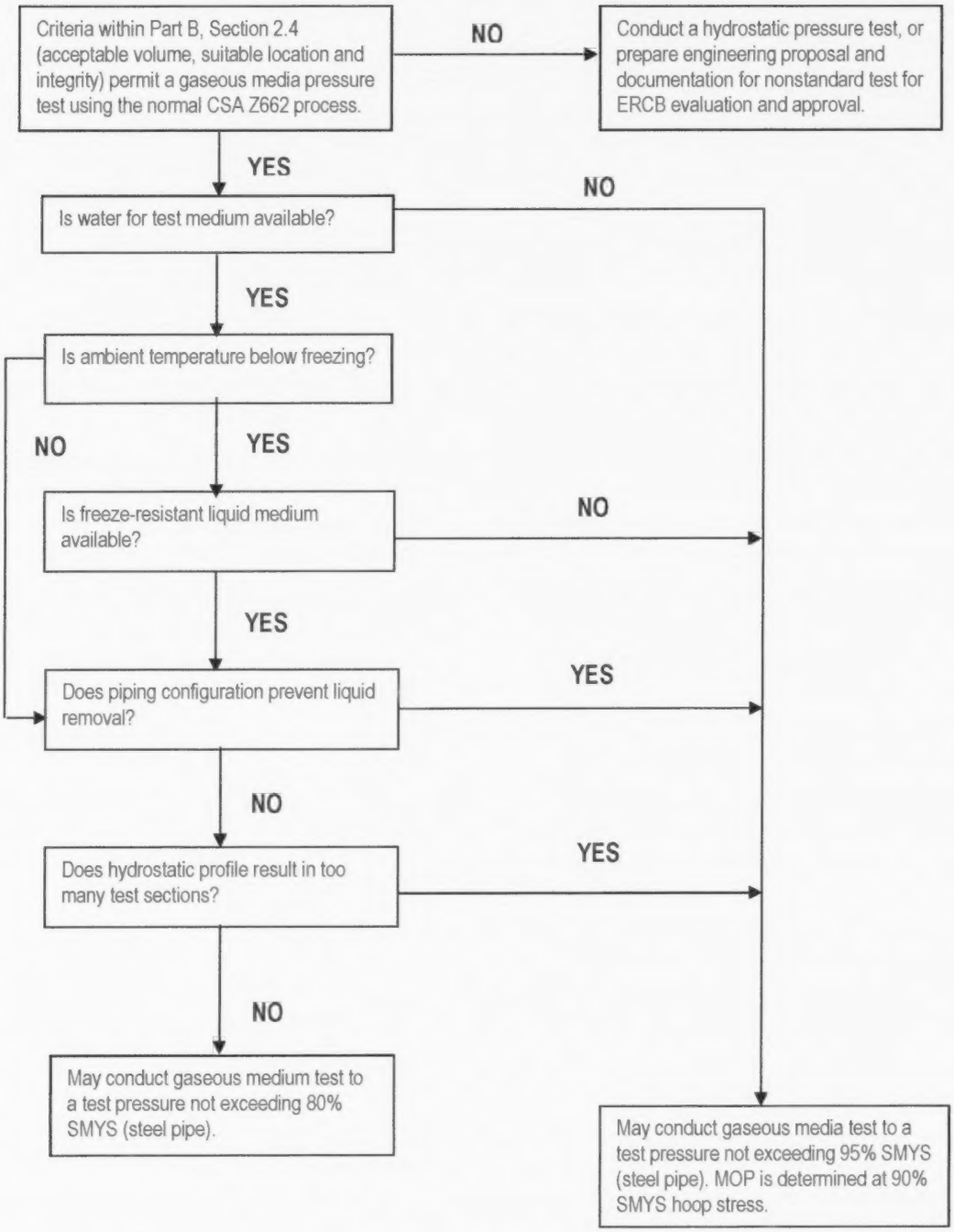
CSA Z662, Clause 8.4.3, states that pressure testing with gaseous media is permissible if one or more of the following conditions exists:

- there is low ambient air temperature, with the temperature expected to fall;
- an appropriate liquid medium of sufficient quality and quantity is not available;
- piping configuration prevents liquid removal; and/or
- the elevation profile of the line would result in an excessive number of test sections.

In these instances, gaseous media testing may be conducted. The test pressure must not produce hoop stresses in excess of 95 per cent of the material's specified minimum yield strength (SMYS), and the maximum operating pressure (MOP) is limited to that calculated from a pressure corresponding to a maximum of 90 per cent of SMYS. Thus the maximum hoop stress allowable at MOP is 72 per cent SMYS (90/1.25=72) for pipeline requiring a pressure test to 125 per cent of MOP.

If none of the above four qualifying conditions exists, gaseous media testing may be conducted, but only to a pressure that will not produce hoop stresses in excess of 80 per cent of the material's SMYS). For a visual representation of this selection process, see the flowchart on the next page.

Selection Process for Gaseous Media Pressure Tests


Criteria within Part B, Section 2.4 (acceptable volume, suitable location and integrity) permit a gaseous media pressure test using the normal CSA Z662 process.
NO
Conduct a hydrostatic pressure test, or prepare engineering proposal and documentation for nonstandard test for ERCB evaluation and approval.
YES
Is water for test medium available?
NO
YES
Is ambient temperature below freezing?
NO
YES
Is freeze-resistant liquid medium available?
NO
YES
Does piping configuration prevent liquid removal?
YES
NO
Does hydrostatic profile result in too many test sections?
YES
NO
May conduct gaseous medium test to a test pressure not exceeding 80% SMYS (steel pipe).
May conduct gaseous media test to a test pressure not exceeding 95% SMYS (steel pipe). MOP is determined at 90% SMYS hoop stress.

2.5 Safety and Environmental Concerns

Although gaseous media pressure tests may be advantageous in certain situations due to not having to procure and dispose of liquid media, there are a number of safety and environmental considerations in the *Pipeline Regulation*, other ERCB documents, and *CSA Z662* that must be carefully evaluated before conducting gaseous media testing:

- Gaseous media used for pressure testing must be air or other nontoxic gaseous media. *CSA Z662*, Clause 12.8.1.1, allows the use of a flammable nontoxic gas for pressure test medium for distribution systems greater than 700 kPa. Natural gas that does not contain any hydrogen sulphide (H_2S) qualifies as nontoxic gaseous media and may be used for pressure testing of **distribution** pipelines, as defined in *CSA Z662*, Clause 8.7.2. For other pipelines, natural gas is allowable for pressure testing within *CSA Z662* Class 1 areas only (Note that there is no reference to this requirement in *CSA-Z662*; this is an ERCB interpretation.)

- Flammable gas, sour fluids, and HVP liquids are not to be used as a pressure test medium. Multiphase fluids are not recommended due to the difficulty in obtaining and maintaining pressure stability and the dangers of a compressible media (*CSA Z662*, Clause 8.4.4).

- All pressure tests must be conducted in a manner that will ensure the protection of people and property in the vicinity of the pipeline. Extra consideration must be made in regard to public notification of any parties that might be influenced by activities occurring in the test area. People not involved in the testing process must be restricted from the area during the testing process.

- As gaseous media are much more compressible than liquid media and the potential consequences from a test failure are greater, additional planning and measures for safety of the public and for protection of workers are necessary. Serious damage or injury may result from the release of energy during a failure of a gaseous media test.

- Piping located under railway or road crossings and stressed to 80 per cent of SMYS during gaseous medium testing may be used and must be pretested separately; however, non-pretested piping may be used if the railway or road is closed to traffic during the pressure testing (*CSA Z662*, Clause 8.12).

- Gaseous media pressure testing should only be performed on steel pipelines that are satisfactorily cleaned. Prior to pressure testing, the completed pipeline sections must be cleaned of construction debris and foreign matter. The operator must evaluate and mitigate the formation of an explosive mixture within the pipeline that could result in internal combustion during the test (*CSA Z662*, Clause 6.2.8).

- If pipelines are purged by or of air, special care must be exercised to prevent the creation of an explosive mixture. Where necessary, inert gas buffers must be used (*CSA Z662*, Clause 11.26.9.2).

- Refer to *CSA Z662*, Annex G.2, for recommendations on purging of pipeline.

- After test completion, the pressure must be released under controlled conditions.

- ERCB *Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting* places restrictions on the amount of gas to be flared or vented and imposes public notification guidelines for flaring of gas if it is used as a test medium.

- Carbon dioxide (CO_2) pipelines that have been hydrostatically pressure tested must be cleaned and dried upon completion of such testing to prevent corrosion that can otherwise occur on start-up of the system (*CSA Z662*, Clause 8.20.8).

- Aluminum pipe and fittings in CO_2 pipelines that have been hydrostatically pressure tested need not be cleaned and dried after completion of such testing (*CSA Z662*, Clause 15.7.3).

2.6 Material Limitations

Restrictions may be placed upon gaseous media pressure testing due to the type and nature of pipeline materials. What follows are supplemental design measures to provide positive control of fracture propagation:

2.6.1 Steel Pipe

Steel pipe must be girth welded and must meet requirements for fracture initiation and propagation (*CSA Z662*, Clauses 8.4.3 and 5.2).

Used (salvaged) pipe may not be tested with gaseous media (*CSA Z662*, Clause 8.4.3).

Concurrent strength and leak tests (pressure testing for a minimum of 24 hours at the strength test pressure) are permitted for pressure testing with a gaseous medium (*CSA Z662*, Clause 8.2.3).

When gaseous media are being used, consideration should be given to operating the test head assemblies at lower stress levels (*CSA Z662*, Clause 8.19.1)—hoop stress not in excess of 75 per cent of SMYS, with ancillary piping operating at a hoop stress of 50 per cent of SMYS of the ancillary piping—than would normally be used in hydrostatic testing.

CSA Z662, Clause 8.19.5, requires new test head assemblies for gaseous-medium pressure testing.

2.6.2 Reinforced Composite Pipelines

Reinforced composite pipelines may be tested with gaseous media (*CSA Z662*, Clause 13.1.6.2). The pressure test medium must be air, water, or water with freezing point depressant. For pressure tests with air, the maximum test pressure must not exceed 2900 kPa.

The pressure test duration for reinforced composite is a minimum of 24 hours for an air test medium (*CSA Z662*, Clause 13.1.6.5).

2.6.3 Plastic Liners

Plastic liners may be leak tested with gaseous media after installation (*CSA Z662*, Clause 13.2).

2.6.4 Polyethylene Gathering System Pipe

Polyethylene gathering system pipe may be tested with gaseous media for 24 hours after pressure stabilization.

For high-density polyethylene (HDPE) at an air test of 125 per cent of the design pressure, the test pressure must be maintained for a continuous period of 24 hours after stabilization of the pressure (*CSA Z662*, Clause 13.3.7.2).

Static electricity builds-up on HDPE, specifically on steel components, during testing with gaseous media. Suitable grounding or operating procedures are needed. Caution must be exercised when using gaseous media for the testing of plastic pipes, since a static charge could be generated from the passage of the gas through the plastic pipe. For this reason, the pipe must be buried and grounded in order to prevent electrical discharge (*CSA Z662*, Clause 13.3.8.5).

Air or another nonflammable nontoxic gas may be used as the pressure test medium for **aluminum pipe**, provided that the following conditions exist at the time of such pressure testing (*CSA Z662*, Clause 15.7.2):

- used pipe was not installed
- <114.3 mm OD
- strength test pressure < 95% of SMYS
- the piping is installed
  - below ground or
  - above ground and
    - the strength test is < 75% SMYS or
    - the strength test is >75% SMYS, but the pipe has been hydrostatically pretested

2.7 Test Section Volume Limits and Duration of Gaseous Testing

Pipelines must be pressure tested in place under the same conditions that will prevail during operation. This means that buried pipelines must be backfilled before testing (*Pipeline Regulation*, Section 25). The *Pipeline Regulation*, Section 40, allows

- pipeline sections less than 75 m in length to be strength and leak tested concurrently with gaseous media for a minimum of one hour; and
- pipeline sections exceeding 75 m in length to be strength and leak tested concurrently for a minimum duration of 24 hours.

In situations that involve large test volumes, *CSA Z662*, Clause 8.10.3, Note 2, requires that the effect of gas compressibility must be considered when determining the length of the test section and the duration of the test in order to detect small leaks. In order to simplify this process, the ERCB (*Pipeline Regulation*, Section 36.1) has determined that test segment volumes of 125 m^3 or less are sufficiently sensitive to minor gas leaks to enable leak detection when tested over a 24-hour period. For larger test volumes, operators must submit to the ERCB Pipeline Operations for approval, using the e-mail address pipelineoperations@ercb.ca, a fully supported engineering evaluation demonstrating that the proposed testing procedures are safe and effective in detecting leaks in segments with test volumes greater than 125 m^3 (*CSA Z662*, Clause 13.1.6.5).

Consideration of the condition of the pipeline must still be made regardless of pipeline volume. The requirements outlined in Section 3.3 also apply.

The 125 m^3 limitation results in approximate **steel** test segment lengths, as given in the following table:

Pipeline diameter (nominal) (mm)	60.3	88.9	114.3	168.3	219.1	273.1	323.9
Test section length (km)	57.8	23.4	14.1	6.3	3.7	2.3	1.7

In order to make valid conclusions regarding test pressure loss, high-resolution (better than 1 per cent) pressure instruments may be required. The pipeline must be allowed to fully stabilize after pressurization **before** beginning the 24-hour test period. Ambient temperature and internal test section temperature must be monitored during the test and reconciled with pressure changes. The operator should also consider alternative techniques to assist in leak detection, such as the use of odorant, gas detectors, ultrasonic leak detectors, thermography, and trained animal detectors.

2.8 Pressure Testing Aboveground Piping

Piping that is aboveground and fabricated items that are fully exposed may be tested with gaseous media for the duration of one hour. An open trench pipeline is not considered to be aboveground piping.

2.9 References

Pipeline Act

Pipeline Regulation

CSA Z662: Oil and Gas Pipeline Systems (2007)

ERCB *Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting*

3 Steam Pipelines

3.1 Introduction

This section explains the ERCB legislative requirements and clarifies the ERCB role regarding steam pipelines and its links to Alberta Boilers Safety Association (ABSA). This section applies to steam pipelines used in the recovery of hydrocarbons from a reservoir or oil sands deposit. This directive is intended to apply where water constitutes the expansible media present in the product stream and exists in the vapour phase under operating conditions.

Steam pipelines used in the recovery of hydrocarbons from a reservoir or oil sands deposit are a "pipeline" under the *Pipeline Act*, R.S.A. 2000, c. P-15. This includes pipelines intended to carry steam, steam and produced fluids, or recovered steam. There may be situations in which produced fluids (emulsion) meet the definition of expansible fluid and require steam pipeline design. It is the responsibility of the design engineer to determine if steam pipeline design is required in the expected operating conditions.

The following sections explain the ERCB legislative requirements and clarify the ERCB role regarding steam pipelines. In general, ABSA is responsible for design registration and quality management system certification for construction, operation, and maintenance of steam pipelines and the ERCB is responsible for addressing landowner concerns and environmental considerations.

3.2 Scope of This Section

The provisions in this section apply specifically to steam pipelines regulated under the *Pipeline Act*. These steam pipelines are exempt from the *Safety Codes Act* and *Pressure Equipment Safety Regulation* by Section 2(1)(c) of the Pressure Equipment Exemption Order (AR 56/2006), but they require design registration by ABSA under the *Pipeline Regulation* AR 91/2005.

The requirements do not apply to

- temporary steam pipelines used in conjunction with an approved oil sands scheme;
- steam pipelines confined strictly within the facility surface lease boundaries of a steam generating plant, a satellite, or a battery;
- steam manifolds, piping, and measuring facilities within the facility surface lease boundary of well sites and multiwell satellites; and
- steam pipelines of internal aggregate capacity not greater than 0.5 cubic metres (m^3) that are not covered above.

Treatment of these exemptions is described in Section 3.4.

A schematic of criteria governing the necessity for ABSA design registration and ERCB licence application is in Figure 3.1.

3.3 Explanation of Requirements

1) Registration of Design: The design of steam and multiple-product steam pipelines on energy recovery projects must satisfy the requirements of *Canadian Standards Association (CSA) Z662: Oil and Gas Pipeline Systems*, Clause 14 and the design must be registered with ABSA in accordance with Section 16(1) of the *Pressure Equipment Safety Regulation*, using Design Registration Application Form AB-31, together with other documentation and applicable forms (available on the ABSA Web site

www.absa.ca). Pressure control and overpressure protection must satisfy the requirements of *CSA Z662*, Clause 4.18, and overpressure protection must be acceptable in accordance with Section 38 of the *Pressure Equipment Safety Regulation*.

2) Application under the Pipeline Act for a Pipeline Licence: The application required by Part 4 of the Pipeline Act must be submitted to the ERCB, in accordance with Section 3 of the Pipeline Regulation, AR 91/2005, with confirmation that the design has been registered by ABSA as required in (1) above.

3) Field Construction and Inspection: Notice of field construction must be provided to the ERCB, in accordance with Section 6 of the *Pipeline Regulation*. Construction quality control documentation is subject to ABSA piping construction quality authorization requirements. Environmental, licence, and ground disturbance inspections may be carried out by ERCB inspectors. Construction may be subjected to inspection by an ABSA Safety Codes Officer.

4) Pressure Testing: The pressure test requirements are specified in *CSA Z662*, Clause 14.5. Notice of pressure test must be provided to the ERCB, in accordance with Section 24 of the *Pipeline Regulation*. ERCB inspectors may require documentation of the successful pressure test. Test pressures, mediums, and procedures must be approved by ABSA, in accordance with Sections 16(1) and 30 of the *Pressure Equipment Safety Regulation*. Testing must be conducted in a manner that satisfies *CSA Z662* and Section 30 of the *Pressure Equipment Safety Regulation*. Records of the successful pressure test must be in accordance with the *Pipeline Regulation* and Section 31 and 32 of the *Pressure Equipment Safety Regulation*.

5) Operations: In-service inspections and integrity management for the pipelines must be addressed in the "Pressure Equipment Integrity Management" system authorization program registered with ABSA for the related pressure plants. ERCB requirements for operation, maintenance, and integrity management of pipelines are superseded by the stated ABSA requirements.

   As required under the *Safety Codes Act*, unsafe conditions and incidents not associated with a failure must be reported to ABSA.

6) Failure Investigation: For the purpose of steam pipelines, a failure is defined as a condition where the pipeline is incapable of retaining the fluid being transported; however, a fluid release of a temporary nature caused by a leakage at flanges, packing glands, and similar fittings and that can be terminated by mechanical adjustments, such as the tightening of bolts, is not considered a failure. This definition is only applicable to steam pipelines addressed in Part B-3 and is based on ABSA requirements for failure reporting. It is intended to ensure that the same reporting requirements are used for both ABSA and the ERCB. (ERCB reporting requirements for pipelines not covered by Part B-3 are not affected.)

   A failure, as defined above, of a licensed pipeline must be reported immediately to the ERCB (Section 35, *Pipeline Act*) and to ABSA. An ERCB inspector may conduct an on-site inspection concentrating on the environmental and emergency response aspects of any fluid loss. The ERCB may require additional information concerning spill containment, recovery procedures, and site rehabilitation (Section 76, *Pipeline Regulation*). Notification to Alberta Environment may also be required.

   A failure report must also be submitted to ABSA without delay. The failure will be investigated by ABSA as a pressure equipment incident, and the conclusions from the investigation will be provided to the ERCB.

In certain circumstances, ABSA and the ERCB may conduct a joint investigation within their respective areas of responsibility as explained in this section. If a failure causes the injury or death of any person, the failure investigation may also involve representatives of Workplace Health & Safety and other regulatory or law enforcement authorities.

7) Changes to Registered Designs and Pipeline Licences: Changes to a registered design are handled by ABSA, in accordance with Section 22 of the *Pressure Equipment Safety Regulation*.

   Amendments to the licensee's ERCB pipeline licence are required only if the design changes lead to a change in the data recorded on the pipeline licence or on ERCB maps.

   In general, the ABSA process does not provide for design registration of an existing ERCB regulated pipeline to accommodate a change to steam service from existing service with any other fluid.

3.4 Treatment of Exemptions

Temporary steam pipelines used in conjunction with an approved oil sands scheme do not require a licence under the *Pipeline Act*. "Temporary" is defined as a period not exceeding 6 consecutive months. For steam pipelines of capacity greater than 0.5 m^3, the usual ABSA registration procedure applies.

Steam pipelines confined strictly within the facility surface lease boundaries of a steam generating plant, satellite, battery, or well site and steam manifolds and measuring facilities at multiwell satellites are considered to form pressure piping systems, as defined in the *Pressure Equipment Safety Regulation*, and do not require a licence under the *Pipeline Act*. ABSA requirements apply in these instances.

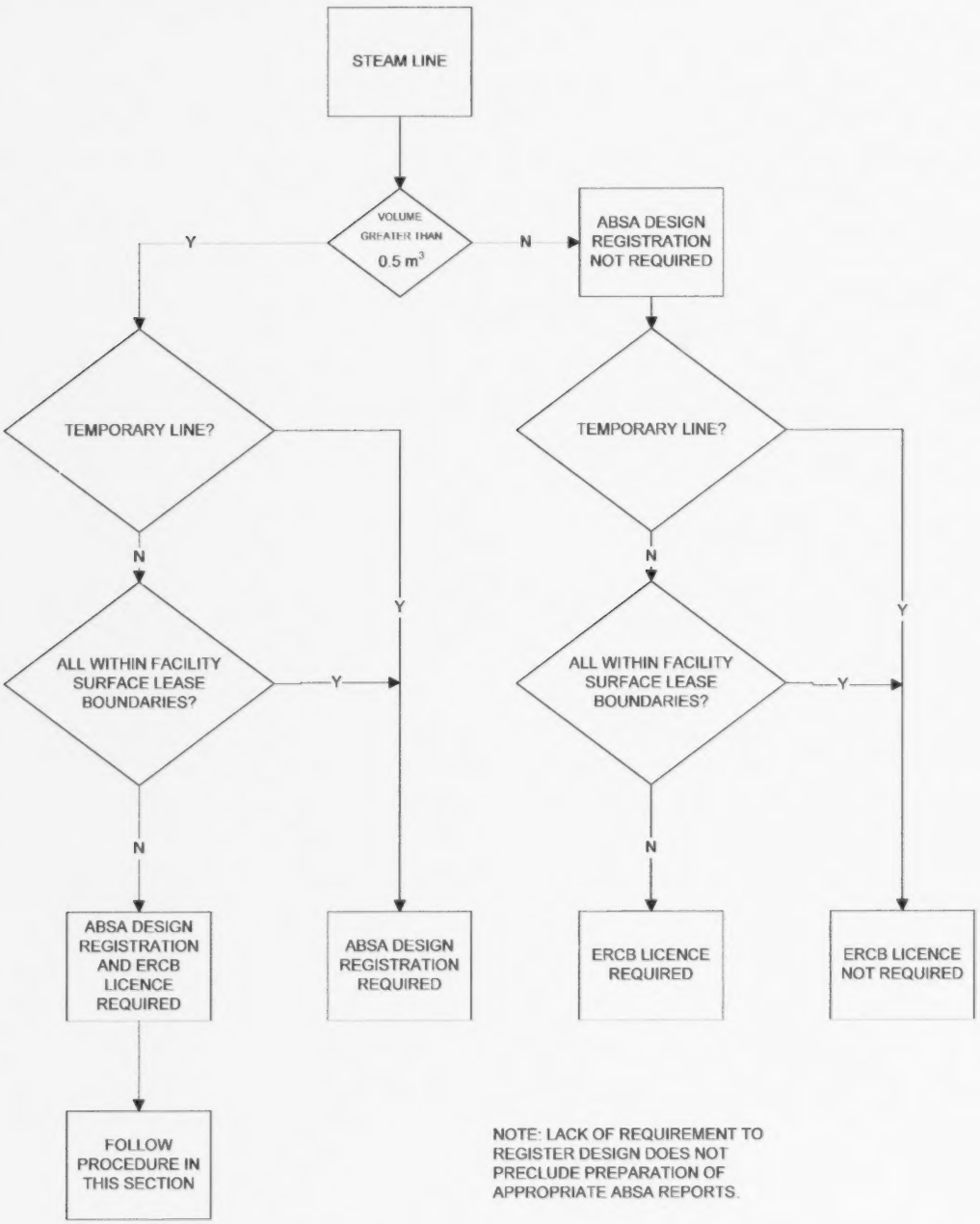
Steam pipelines of internal aggregate capacity not greater than 0.5 m^3 do not require design registration under the *Pressure Equipment Safety Regulation*. There is no similar exemption under the *Pipeline Act*. For those pipelines not covered under the exemption for temporary steam pipelines above and that traverse or enter land outside the facility surface lease boundaries of a plant, well site, satellite, or battery, the ERCB requires a licence application containing sufficient technical information to enable it to satisfy itself that the design complies with the requirements of Clause 14 of *CSA Z662*. If mechanical couplings are used, the application must contain a statement stamped by a professional engineer that indicates such couplings are registered with ABSA.

3.5 Exclusions Relating to This Section

Nothing in this section is intended to require either the ERCB or ABSA to disclose information that it is required to hold in confidence; however, such information may be disclosed provided that reasonable arrangements exist to protect the confidentiality of the information, having regard to the quantity and type of information in question and the responsibilities of the party to whom the information is to be disclosed. The parties are free to share information that is not considered confidential and are encouraged to do so in order to further the purposes of this section.

References in this section to statutes and regulations include amendments thereto made from time to time.

Figure 3.1 Criteria for Registration of Design and Licence Application



3.6 References

Pipeline Act

Pipeline Regulation

Pressure Equipment Safety Regulation

CSA Z662-07: Oil and Gas Pipeline Systems

Information Bulletin IB10-006 Rev.1: ABSA Requirements for Steam Pipelines

4 Joint Use of Right-of-Way

4.1 Background

This section replaces and rescinds *Informational Letter (IL) 80-11: Joint Use of Right of Way*. It addresses requests to the ERCB for clarification of the requirements governing pipeline rights-of-way.

4.2 Interpretation

Multiple pipeline rights-of-way can be a serious impediment to the use of the land. There are many legal, financial, and planning issues that may influence current practices for acquiring and using pipeline rights-of-way. The joint use of a right-of-way in certain circumstances continues to be an obvious solution to problems facing both licensees and landowners. The ERCB has the authority to direct the joint use of a right-of-way, and the right of entry can be applied for at the Surface Rights Board under the provisions of the *Surface Rights Act*. Licensees should consider joint use of unused portions of a right-of-way where such practice would be feasible and would significantly reduce the impact on the landowner's use of this land.

Information on specific requirements and procedures for registering a survey plan before commencement of construction, as required in Section 4(1) of the *Pipeline Regulation*, and for registering the utility right-of-way can be found at
www.servicealberta.gov.ab.ca/LandTitles.cfm and
www.srd.alberta.ca/ManagingPrograms/Lands/DirectorOfSurveys/Default.aspx.

4.3 References

Pipeline Act

Pipeline Regulation

Land Titles Act

Surveys Act

Director of Surveys Policy, Dual Registration of Public Land Surveys

5 Use of Concrete Slabs for Pipeline Protection at Pipeline Crossings of Roads

5.1 Background

With continued population growth in Alberta, there is continual ongoing development and pressure on the road authorities to improve the existing road and system. When this is coupled with the existing extensive pipeline network, interaction between the systems is inevitable. To provide for continued safety, any pipeline affected by new development, road widening, re-alignment, or other work must be evaluated to determine whether it must be upgraded, lowered or receive armouring treatment to accommodate the extra stresses due to road loadings.

This section replaces and rescinds *IL 91-4: The Use of Concrete Slabs at Pipeline Crossings of Highways and Roads*.

5.2 Interpretation

The design of new pipelines crossing roads is governed by the CSA pipeline standards. Clauses 4.11 and 4.12 in *CSA Z662-07* provide depth of cover and design requirements for cased and uncased crossings. These clauses do not allow the use of concrete slabs for the control of stress in new pipelines.

Clause 10.8.2 in *CSA Z662-07* requires that existing pipelines that are to be crossed by roads must at those locations be either upgraded or subjected to an engineering assessment and detailed engineering analysis of all loads expected to be imposed, including the resulting combined stresses in the pipeline. Where the engineering assessment concludes that the pipeline is in satisfactory condition, any crossing design may be used that results in acceptable combined pipe stresses in accordance with the requirements of Clause 4.6. Load-distributing structures, such as concrete slabs, may be appropriate for such situations.

5.3 Slab Design

The pipeline licensee is responsible for completing the required engineering assessment to determine if the pipeline is in satisfactory condition and whether a load-distributing structure would result in acceptable combined stresses.

Clause 10.14.6 in *CSA Z662-07* sets out the requirements for the engineering assessment and the requisite documentation, which must be retained for the life of the pipeline. Clause 10.14.6.1 requires engineering assessments to be conducted only by, or under the direct supervision of, individuals with demonstrated understanding and experience in the application of engineering and risk management principles related to the issue being assessed.

5.4 Sharing of Costs

Load-distributing structures may provide substantial cost reductions as an alternative to extending casing, lowering pipe, or installing thicker-wall pipe when required by construction activities.

The ERCB encourages negotiations between the road authorities and the licensee to determine a mutually satisfactory method of complying with the CSA requirements in the most cost-effective way. If an agreement cannot be reached, it is possible for either party to apply to the ERCB under Section 33 of the *Pipeline Act* for direction. Part 9 of the *Pipeline Regulation* provides the application requirements.

5.5 References

Pipeline Act

Pipeline Regulation

CSA Z662-07: Oil and Gas Pipeline Systems